AMERICAN GAS JOURNAL

90th YEAR | JULY, 1948 | VOL. 169, NO. 1

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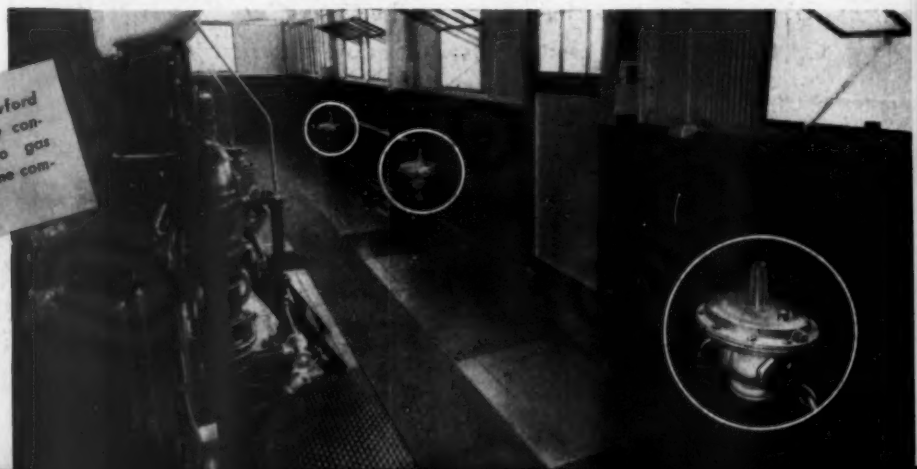

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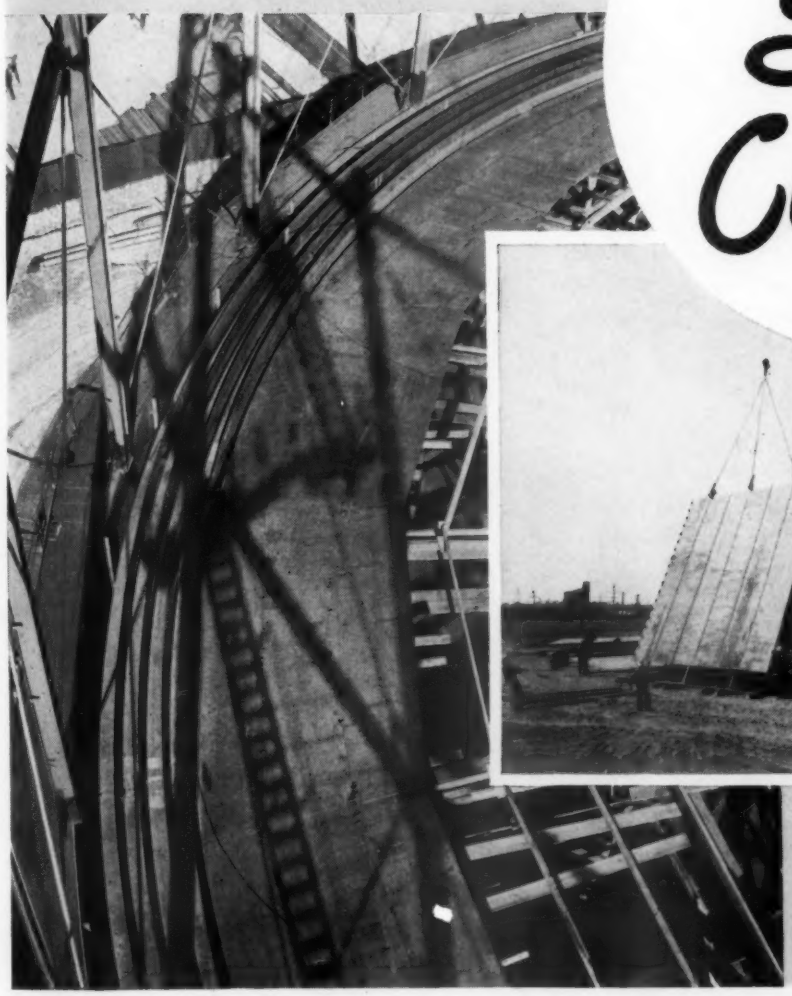

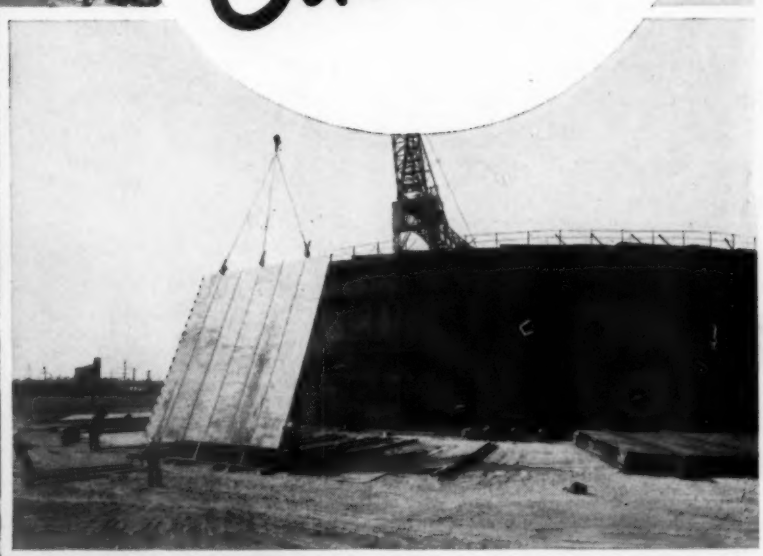

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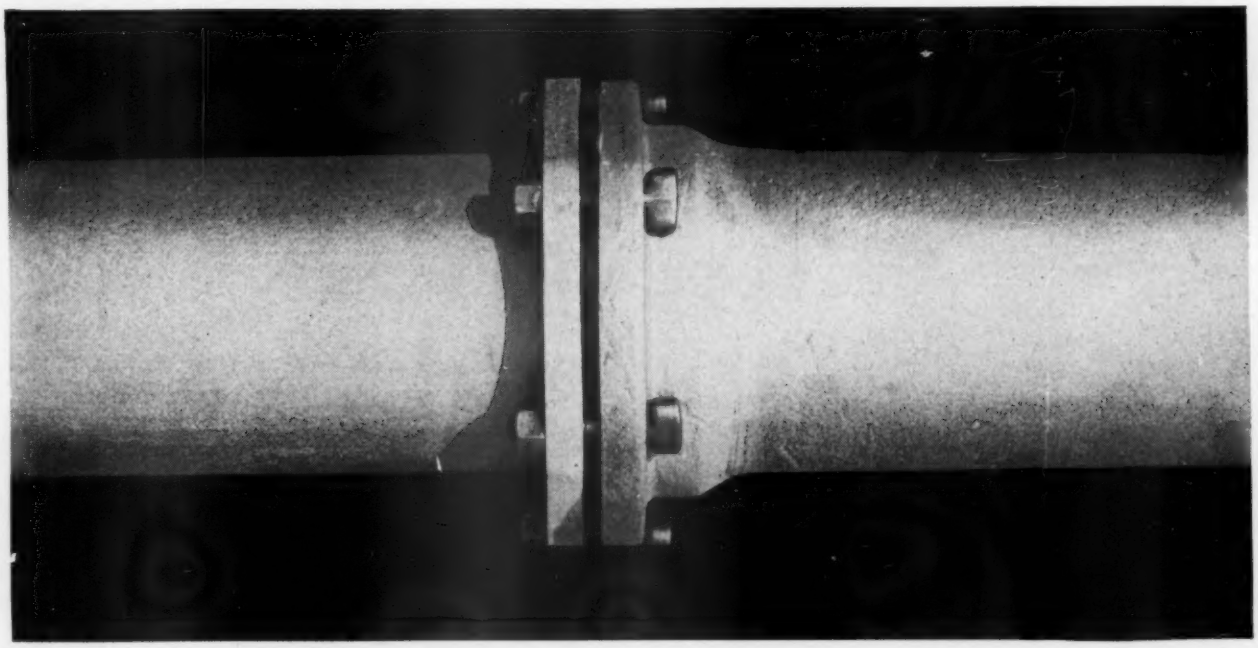

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Thomas F. Wolfe, Engineer, Peoples Gas Bldg., Chicago 3.

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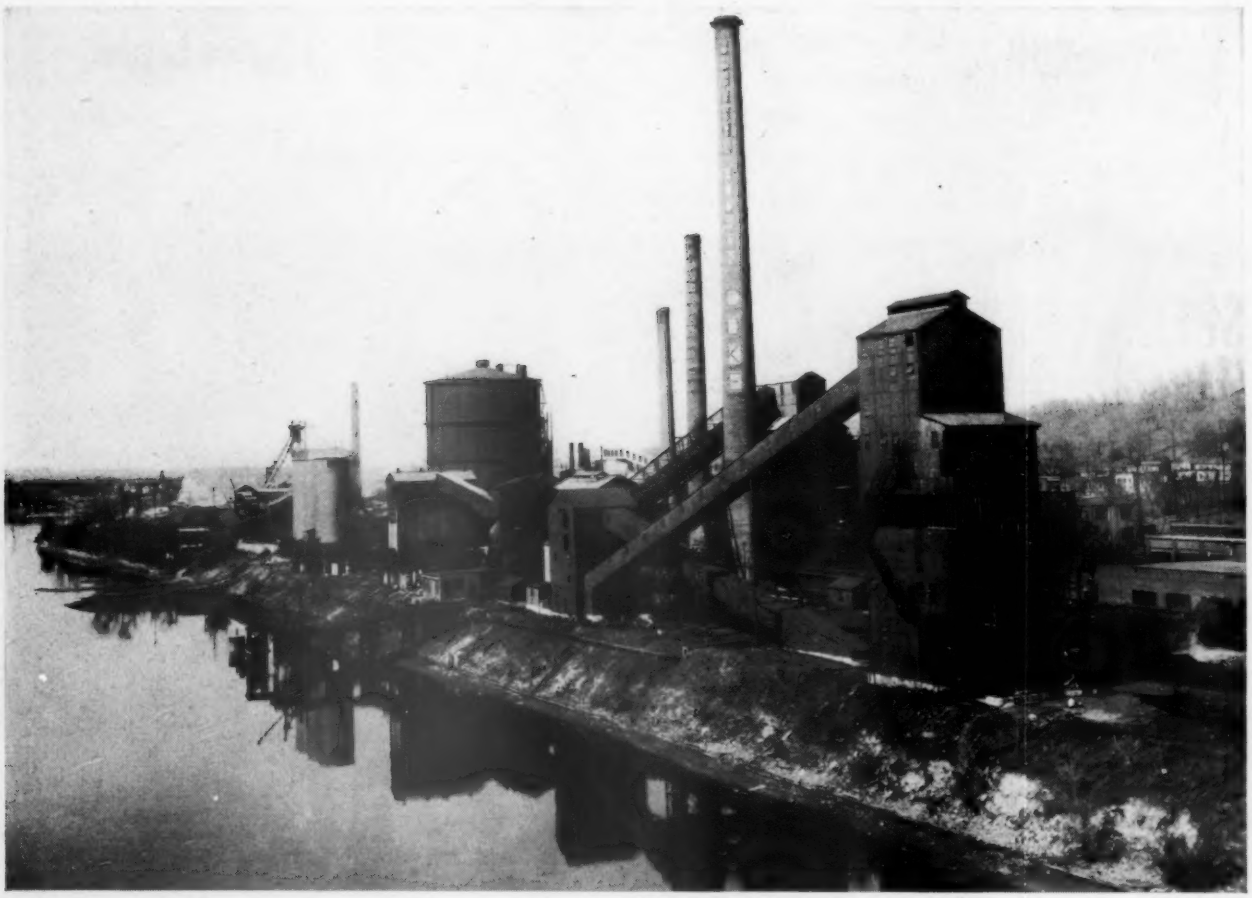

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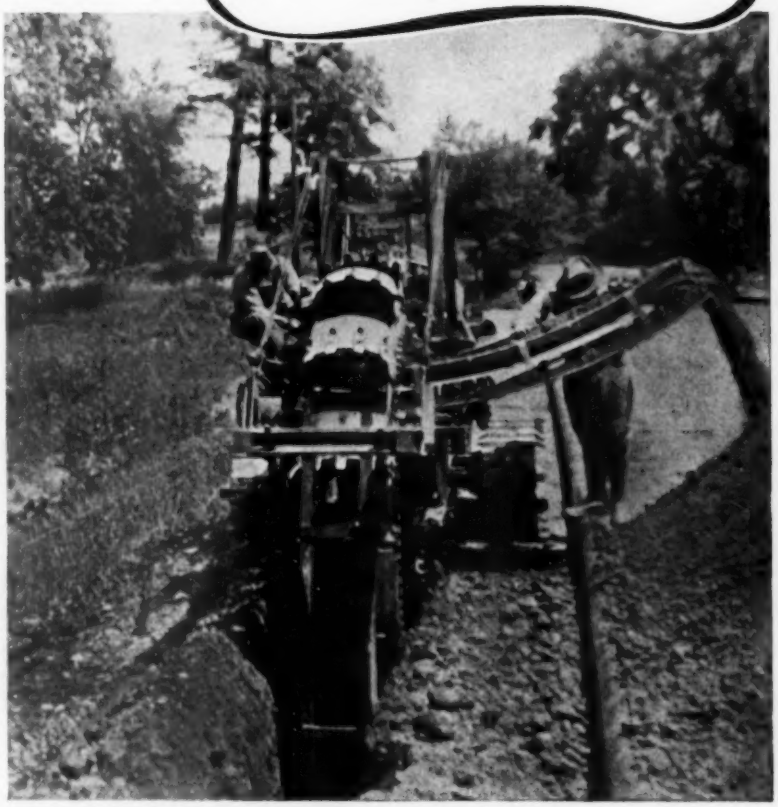

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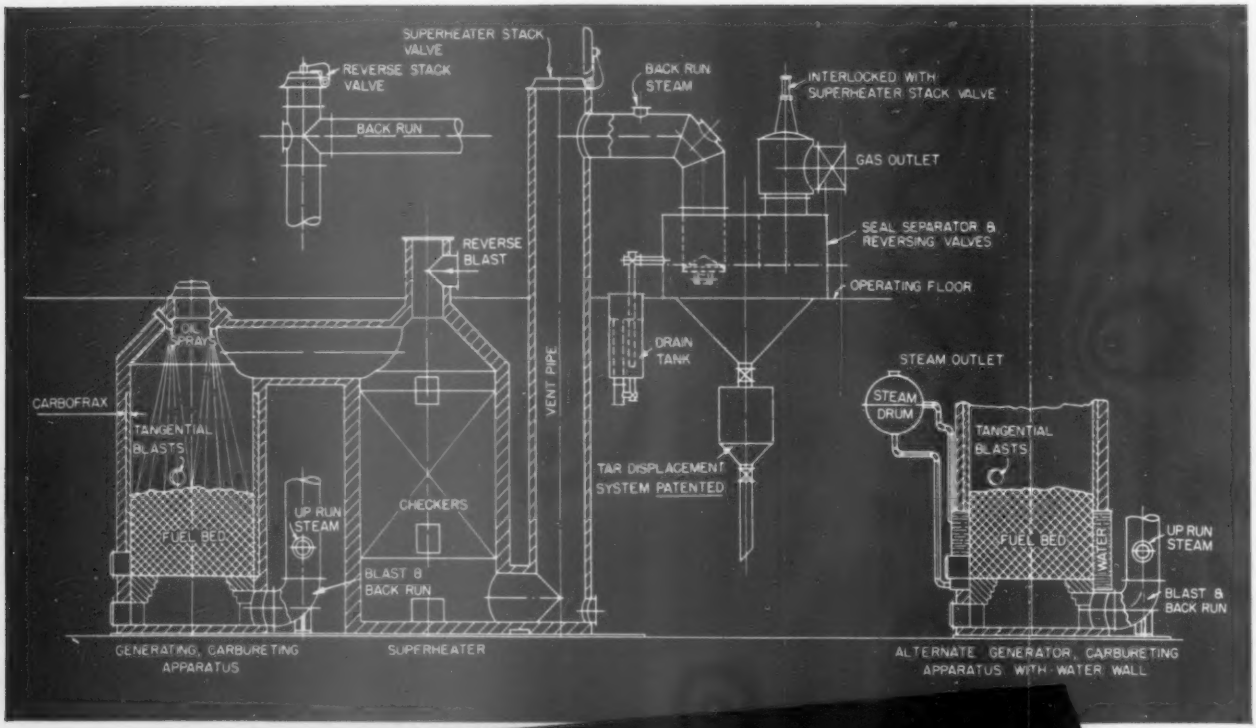

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VOLUME 169
Number 1

AMERICAN GAS JOURNAL

ESTABLISHED 1859

WHOLE
NUMBER 3892

JULY 1948

PUBLISHED MONTHLY BY
AMERICAN GAS JOURNAL, Inc.
53 Park Place, New York 7

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Copyright, 1948, American Gas Journal, Inc.

Subscription $3.00 per year U.S.A.; $4.00 Canada; $5.00 Foreign. Single copies 35 cts.

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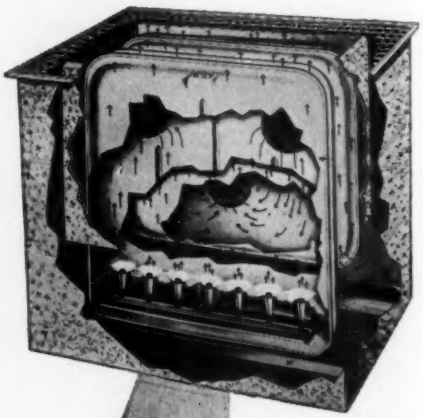

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JULY
1948

AMERICAN
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VOLUME 169
NO. 1

The Catalytic Cracking Process as a Means of Peak Load Shaving

By

S. W. Horsefield
Gas Production Manager,
Long Island Lighting Company,
Mineola, New York

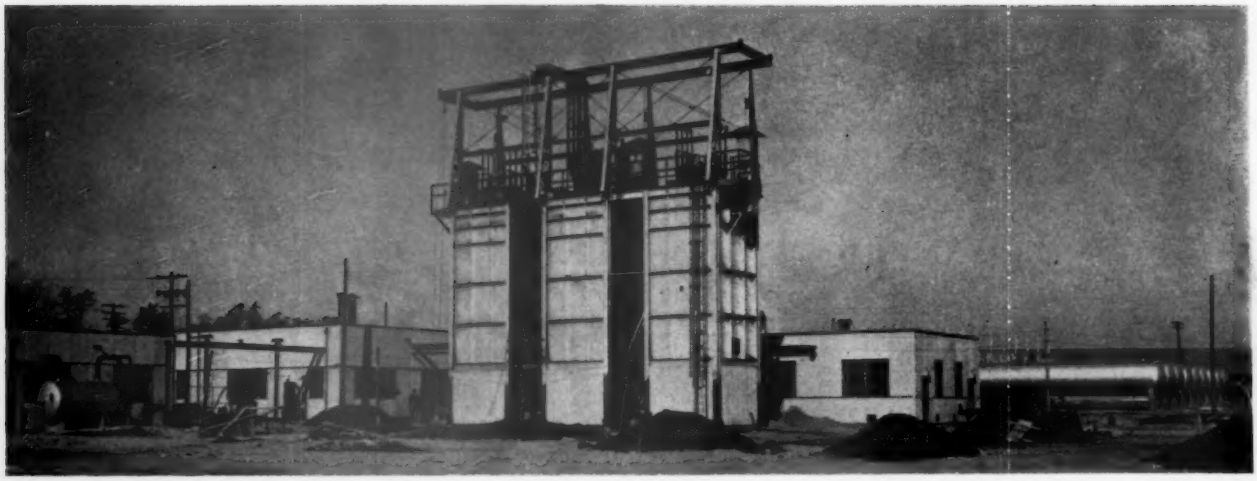
THE OPERATION of a liquefied petroleum catalytic cracking plant installed at Riverhead in the eastern section of the Long Island Lighting Company's territory has proven to be a successful means of not only providing additional gas production, but also of relieving the gas transmission system during peak load periods.

The catalytic cracking process is not new to industry. It has been used for several years for the production of gas for use in furnace atmospheres and for glass manufacturing heating processes requiring close control of the chemical constituents of the gas. The Riverhead plant is, however, the first full scale plant to be used by a gas utility company. The process is basically that of reforming hydrocarbon gases at high temperatures in contact with a catalyst. The resulting gas is of relatively low specific gravity and heating value, and is composed mainly of hydrogen and carbon monoxide. The reformed gas thus produced, may be cold enriched with liquefied petroleum gas vapor to the desired heating value. The process may be controlled to produce a gas within wide limits of specific gravity and heating value, making possible the production of a gas that is almost identical, in physical and combustion characteristics, to the base gas normally supplied. It is therefore, a complete substitute gas, and may entirely replace the normal supply from the base load plant. This is a distinct advantage over liquefied petroleum-air gas mixtures which are widely used as a supplement gas for peak load purposes. It is well recognized that the high specific gravity of liquefied petroleum-air gas imposes strict limitations in its use, depending chiefly on the chemical composition and specific gravity of the base gas. The Long Island Lighting Company's experience using butane-air as a supplement gas indicates that, for their system, the limit of interchangeability is reached when the butane-air gas added is approximately 22% of the base gas.

Producing a 100% substitute gas, the catalytic cracking plant is ideally suited to serve areas at locations remote from the base load plant, consequently relieving the transmission facilities serving the area and eliminating the necessity of substantial investment for additional transmiscapacity. This is very well demonstrated when applied to the Long Island Lighting System. Figure 1 is a general map of the System and shows the location and capacities of the gas production plants, the principal gas transmission mains, and the approximate distribution of the gas load throughout the territory on a percentage of System load and a peak-day basis.

Transmission System

The gas transmission system is essentially high pressure. Pressures up to 75 p.s.i. are presently used and up to 100 p.s..i are being planned for some locations in the near future. The base load plants are located at Rockaway Park, Hempstead and Bay Shore. During the past year, liquefied petroleum-air plants were installed and put into operation during last winter's peak load, at the Inwood Holder and Compressing Station, at the Hempstead Works, and at Babylon, 5 miles west of the Bay Shore Works. These L.P.-air plants were designed to supply peak shaving to the western section of the territory where the load concentration is the greatest. On account of the relatively small consumption at the east end of the Island and the limitations of liquefied petroleum-air gas, it was decided that a plant that could supply the entire gas demand in this territory was desirable. This decision was further influenced by the fact that this area has a summer load almost equal to that of the winter, and that the present transmission system is being operated at full capacity. Gas to this area is pumped from the Bay Shore Works at an initial pressure of 75 p.s.i. and delivered via an 8" and a 6" main to Holtsville, where the pressure is boosted from about 15 p.s.i. to 85 p.s.i. at an unattended automatically-operated compressor station. Leaving Holtsville, the gas is transmitted through a 6" main to Riverhead where it is again boosted in pressure at another unattended automatic station and finally delivered through 6" mains branching out to serve the north and south forks at the extremity of the Island. The new catalytic cracking plant, located at Riverhead, produces sufficient gas to supply all the load at the east end of the Island, and, by reversing the compressor connection at Holtsville, it also supplies part of the load to Sayville and



Battery of three catalytic cracking furnaces producing gas for delivery to mains of Long Island Lighting Co. Furnaces are 30 feet in height. Superstructure carries crane for installation of cracking tubes. Notice absence of gas holder. Propane storage cylinders in right background. Building houses boiler and compressor rooms, control room and plant office. (Photo shows partially completed installation.)

Patchogue, west of Riverhead on the South Shore. This relieves the Bay Shore Plant of supplying some 2,500 MCF, which quantity is made available for the more concentrated load demand west of Bay Shore. The distance from Bay Shore to Riverhead is approximately 40 main miles. The present transmission system between these points is being used to capacity, and were it not for the new Riverhead Plant, an investment of over $1,000,000 would be necessary for additional transmission mains.

Plant Equipment

The equipment installed at Riverhead is for operation with a feedstock of propane, butane, or both, for gas production, and light oil for heating the cracking furnaces. Facilities for both light and heavy oil are provided for fuel supply to the boiler.

The cracking plant consists of three Surface Combustion Corporation catalytic cracking units, two of which were originally designed for the Washington Gas Light Company for reforming natural gas at about 25 p.s.i., and were also to be heated with natural gas. However, on account of Washington converting to 100% natural gas, the units were not installed by that company but were modified by the Surface Combustion Corporation to permit firing with light fuel oil, and with the addition of a third similar unit, were installed at Riverhead.

Each unit consists of a vertical rectangular furnace, approximately 11 feet square and 24 feet high, mounted on a steel structure so that the base is 9 feet above ground level. They are constructed of steel and are refractory lined. Suspended at the top of each furnace and extending vertically through to the under side are eight 5¾" inside diameter cracking tubes cast of chrome-nickel alloy. The total length of these tubes is approximately 26 feet and they are made up in three sections which are joined together by means of specially designed couplings which are welded to the sections. Attached to the top of each tube is a tube-type primary cooler, and to the bottom, a flexible connection through which the gas, air and steam mixture is fed. At the top of the furnaces is a steel structure supporting a gantry crane to provide convenient means of installing or removing the tubes.

Each furnace is heated by 15 oil burners installed in three rows of five in the furnace floor in such a manner that each tube is surrounded by four burners and is thereby provided with uniform heating. The catalyst used is the Surface Combustion Corporation's special nickel-oxide catalyst which is impregnated in a support consisting of ¾" refractory cubes. These cubes occupy approximately 19 feet of tube space in the hot zone of the furnace; above and below this zone the tubes are filled with small pieces of alundum rock. The tubes are connected to manifolds at the top and bottom and are provided with valves to permit any tube to be isolated should the tube fail or if it is found necessary to burn out carbon deposits. Air supply lines are provided at the bottom, and vent lines at the top of each to enable the catalyst to be revivified in any tube without affecting the operation of the others. In the outlet connections at the top of each tube is an orifice connected to a mercury manometer located at ground level and provided with electrical probes. The function of this manometer is to permit the operator to distribute the feed to the tubes properly, and also to sound an alarm automatically in the event of tube failure.

The main items of auxiliary equipment are as follows:—

a) A liquefied petroleum storage plant consisting of nine standard 30,000 gallon water capacity tanks, railroad siding, two tank car unloading stations, and piping arranged to permit two types of feed-stock to be used simultaneously.

b) Two 19,000 gallon oil storage tanks with unloading and supply pumps.

c) A package type completely automatic 200 H.P. and 200 p.s.i. Cyclotherm boiler.

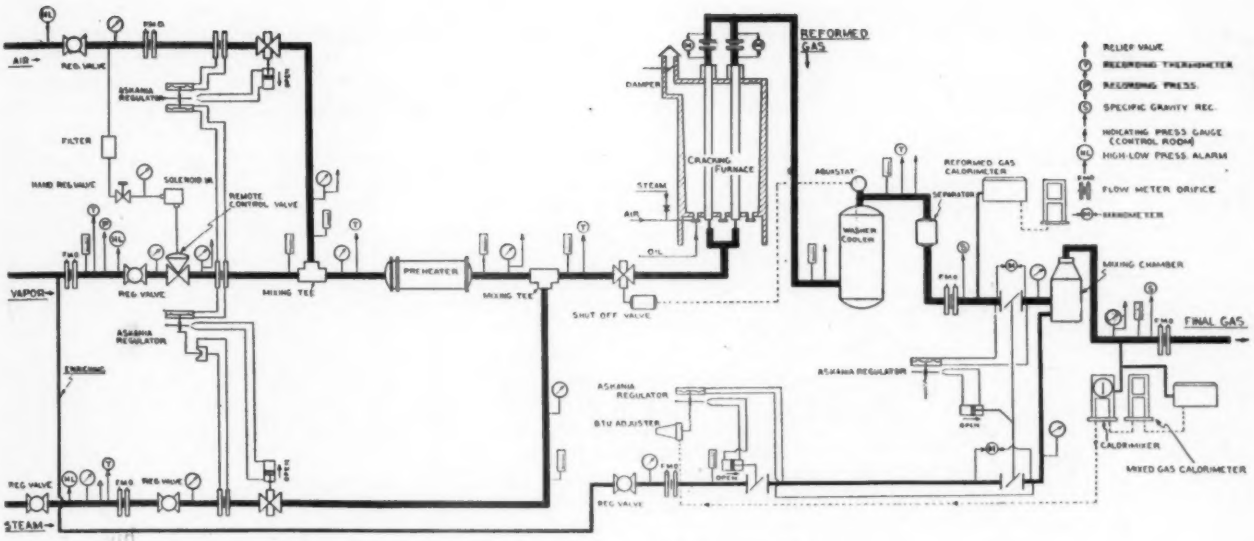
d) Three Phillips Petroleum L.-P.G. steam heated vaporizers, each with a capacity of 1,000 gallons per hour and equipped with automatic temperature control.

e) A direct contact-type washer-cooler with circulating water pump, heat exchanger and fresh water connections.

f) An Ingersoll-Rand steam-driven gas compressor with a capacity of 116 MCF per hour at 15 p.s.i. suction pressure and equipped with an automatic governor to maintain a constant suction pressure.

g) A fresh water supply system consisting of an electrically-operated Johnston 300 g.p.m. deep well pump, piping and diffusion wells to return uncontaminated cooling water to the ground.

All auxiliaries are automatically controlled making the plant entirely automatic in operation.



FLOW DIAGRAM OF THE GAS MAKING PROCESS

The Process

A flow diagram of the process is shown in Figure 2. Four operations are necessary: mixing the L.P.G. vapor, air and steam in the correct proportions; cracking this mixture in the cracking tubes; cooling the resulting reformed gas; enriching this gas to produce a final gas of the desired heating value.

The main control of the plant is the flow of process vapor which is regulated by means of a remotely controlled valve operated by air pressure from the main control panel. The proportions of process air and steam required are automatically maintained by Askania controlled piston-operated valves. Vapor and air are first mixed and heated by passing through a steam heated tube-type pre-heater to 350°F before the process steam is added. The mixture of vapor, air and steam is then fed to the manifold at the bottom of the furnace and distributed to the cracking tubes.

The cracking furnace temperatures are automatically maintained within close limits at a temperature of 1800° F by Leeds-Northrup pyrometer-potentiometer controllers that regulate the oil pressure at the furnace burners. The hydrocarbons in the feed mixture reform in passing through the hot catalyst in the tubes; also, dis-association of steam by the water gas reactions occurs during this passage. The resulting reformed gas is cooled in primary coolers at the top of each tube to approximately 350° F and delivered through a manifold to the washer-cooler where it is further cooled to 70°F. The reformed gas is then enriched with L.P.G. vapor to produce a final gas of 540 Btu. This is accomplished by means of Cutler-Hammer calorimixer and Askania proportioning devices. Passing through a mixing chamber, the final gas is pumped by the gas compressor and delivered to the gas transmission system at pressures up to 65 p.s.i.

The type of gas produced by the cracking process depends on the proportions of air and steam in the feed to the tubes and is usually referred to as "air-gas" or "steam-gas" according to whether air or steam predominates in the mixture. By controlling these proportions, reformed gas varying from 180 to 350 Btu. and from .52 to .65 specific gravity may be produced; the higher Btu. and lower gravity being those obtained with steam-gas. The gas output is considerably greater and less furnace heat is required for air-gas than for steam-gas operation. The variation in the type of gas produced, made possible merely by changing the air and steam proportions, makes the process extremely flexible, and enables a final gas to be produced that closely matches almost any type of manufactured gas normally supplied by utility companies.

The completely automatic features of the plant make possible its operation with only two men per shift, one of which is a technically trained engineer. It is controlled from a central control room which houses all instruments, meters, gauges and controls. These include: recording flow meters for process vapor, air and steam; meters for reformed, enriching and final gas; specific gravity and calorimeter recorders for reformed and final gas; and various recording and temperature gauges. Automatic shutdown equipment is provided which not only shuts down the plant

Calorimeters (Btu controls) and controls for temperature and gas flow in control room.

in the event of a failure of supply of any feed ingredient, but sounds an alarm and indicates by means of lights the cause of the shutdown. The alarm also sounds in the event furnace temperatures go beyond the upper or lower limits set on the control pyrometers; lights indicate which furnace is affected and whether the temperature is high or low.

Operating Results

The plant was originally designed for a production capacity of 25 MCF per hour per catalytic cracking unit. However, as a result of further development by the Surface Combustion Corporation, outputs over three times this amount were found possible if sufficient heat input to the furnaces was provided. This was confirmed by the pilot plant tests made at Chester by the Institute of Gas Technology under the sponsorship of this Association. Accordingly, the original furnace heating burners were replaced with ones of higher capacity. Results obtained during four different test runs are shown in table shown in Figure 3. Run "A" was operation with the original burners, and runs "B," "C" and "D" with the high capacity burners. All these test runs were made with one unit only in operation. A, B, and C runs were made producing a final "matched gas" of 540 Btu. and .68 to .70 specific gravity. Run D was made producing a final 100% interchangeable gas of 540 Btu. and .80 specific gravity. Runs A, B, and C may be considered to be steam-gas and run D air-gas operation. The ultimate limit of production capacity was not reached in these tests. It was found necessary to limit output in runs C and D on account of excessive gas temperature which reached 600°F at the outlet of the primary coolers. Minor changes in these coolers are being made to correct this condition and it is expected this will permit capacities to be increased by 10% to 15%. It would appear that the ultimate capacity will depend on the rate of carbon deposition on the catalyst, and the consequent curtailment in production when burning out these carbon formations. It is believed that very high production rates may be possible for short periods. This is a distinct advantage for peak load supply particularly if the hourly load factor is high.

During the tests at Riverhead there was no evidence of carbon deposition and it is believed that production at the rates shown could continue for a prolonged period before burn-out would become necessary.

The amount of CH_4 in the reformed gas is a good indication of probable carbon deposition; burn-out should not be necessary if this does not exceed three to four per cent.

The main object of the tests reported was to determine the gas making capacity of the units. It is interesting to note, however, that the most economical operation was attained in test run B, on account of the larger amount of gas produced by the water-gas reaction.

The only feed-stock thus far used at Riverhead is propane, but tests will be made with butane before the coming winter. Tests completed by the Institute of Gas Technology using butane at the Chester pilot plant, indicate that higher production rates are possible with this feed-stock. Research work at Chester in connection with the A.G.A. Project CPR-1C is continuing with various other hydrocarbon feed-stocks and much valuable information is being obtained. The Surface Combustion Corporation has further developed the process for operation with a feed-stock of natural gasoline, and plants of this type are now being built for the Consumers Gas Company, Reading, Pennsylvania, and Harrisburg Gas Company, Harrisburg, Pennsylvania.

RIVERHEAD CATALYTIC CRACKING PLANT, L. I. L. CO.
OPERATION DATA & RESULTS

Final Gas		*A*	*B*	*C*	*D*
Total Output/unit MCF/hr.		21.00	50.00	64.00	72.30
Heating Value Btu. (Calor)		540	540	539	540
Specific Gravity (Ranarex)		0 68	0.70	0.70	0.80
Analysis (Calc.)	CO_2	1.0	7.1	3.9	1.7
% Vol.	CO	22.5	13.5	18.1	19.5
	H_2	38.9	41.5	39.8	28.6
	CH_4	0.9	1.6	2.0	0.8
	C_3H_8	14.3	14.0	14.1	15.3
	N_2	22.4	22.3	22.1	34.1
Reformed Gas					
Gas Produced MCF/hr.		18.00	43.00	55.00	61.20
% of Final Gas		85.7	86.0	85.9	84.7
Heating Value Btu. (Calor)		237	220	230	190
Specific Gravity (Ranarex)		0.53	0.55	0.55	0.65
Analysis	CO_2	1.1	8.3	4.6	2.0
% Vol.	CO	26.2	15.7	21.1	23.0
	H_2	45.5	48.2	46.3	33.8
	CH_4	1.0	1.9	2.3	1.0
	N_2	26.2	25.9	25.7	40.2
Process Vapor MCF/hr.		1.67	2.93	4.80	4.95
Process Air MCF/hr.		5.58	11.54	17.00	29.45
Process Steam lb./hr.		200	930	730	215
Steam lb./MCF Ref. Gas		11.1	21.6	13.2	3.5
Air Cu.Ft./Cu.Ft. Vapor		3.34	3.94	3.54	5.95
Ref. Gas MCF/Cu.Ft. Cat. (Cat:27.4 c.f.)		0.66	1.57	2.00	2.23
Furnace Heating					
Oil Gallons/hr.		29.8	42.5	36.9	31.7
Air Cu.Ft./hr. (Est.)		4200	6000	5200	4500
Ave. Temp. Top °F.		1750	1765	1745	1770
Ave. Temp. Bottom °F.		1825	1870	1875	1830
Ave. Temp. (Control) Center °F.		1775	1800	1800	1800
Efficiency					
Tube Efficiency (Ref. Gas) %		109.0	137.3	112.5	99.8
Overall Eff. (Based on 135,000 Btu./gal. Fuel Oil) %		65.9	74.5	75.2	72.8
Enriching					
Used MCF/hr.		3.00	7.00	9.00	11.10
% of Final Gas		14.3	14.0	14.1	15.3
Btu./Cu.Ft.		2347	2347	2347	2347
Specific Gravity		1.52	1 52	1.52	1.52
Materials Used/MCF of Final Gas					
Propane-Process-gallons		2.18	1.61	2.05	1.87
Propane-Enriching-gallons		3.91	3.84	3.85	4.21
Propane—Total—gallons		6.09	5.46	5.90	6.08
Furnace Heating Oil gallons		1.42	0.85	0.58	0.44
Steam Process lbs.		9.53	18.60	11.40	2.97
Steam Vaporizing (Est.) lbs.		4.20	3.74	4.00	4.20
Steam Preheater (Est.) lbs.		3.10	2.67	3.20	4.50
Steam Total lbs.		16.83	25.01	18.60	11.67
Air—Process Cu.Ft.		265	231	266	407
Air Burners (Est.) Cu.Ft.		(10 lbs. Stm.)	120	82	62
Air Total		265	351	348	469

Conclusions

The catalytic cracking process is ideally suited for gas production for peak loads and has the following advantages:

1. It produces a perfectly matched gas which can be used to supply a 100% replacement gas.
2. If located at a point remote from the base load plant it can com-

(Concluded on Page 50)

Equipment and Processes for Manufacturing Higher BTU Gases

By

J. P. Stephens

Gen. Supt. Gas Production,
The Cincinnati Gas & Electric Company,
Cincinnati, Ohio

THE SUBJECT of the production of Higher B.t.u. gases is of continuing importance to both manufactured and natural gas distributing companies. The production of these gases for meeting emergencies and peak demands, for peak shaving, and for increasing the capacity of existing distribution systems and the thermal capacity of existing manufacturing plants appears to be a continuing and pressing problem. The problem of utilizing existing equipment for this production without unduly increasing investment totals is of great importance to all distributing companies in these times of constantly and rapidly increasing demands on their systems.

Many companies are finding it economical to install L.P.G. facilities but others who have existing water gas plants which can be modified are more concerned with using this existing equipment. Certainly where these plants already exist, it is easier and cheaper, from the investment standpoint, to provide storage for gas oil and solid fuel than to build storage and mixing equipment for new L.P.G. installations of equivalent daily capacity. However, operating labor costs may be considerably higher for the High B.t.u. Manufactured Gases than for L.P.G. Each company must balance the investment and operating costs as well as the availability of raw materials, when needed, before deciding on which type of installation to make.

In order to assist those interested in manufacturing Higher B.t.u. gases, this survey of processes, and equipment available for such production, was undertaken.

1. Standard water gas sets are modified by the addition of equipment necessary to increase oil input. The modifications normally required are:

   a. Installation of oil sprays in the generator dome.
   b. Steam nozzles or controls to admit steam into dome of generator during up-run.
   c. Separate oil meters to generator and carburettor.
   d. Necessary additional steam meters.

The oil is sprayed into both generator and carburettor during the up-run with steam being admitted below the grates and over the fire at the same time. If a down-run or a back-run is used, some oil may be reformed in passing through the fire. Oil admission is normally cut off into the generator during down-run or back-run, but continued in the carburettor.

On split run machines, it is not necessary to make down-runs as the oil sprayed into the generator sufficiently cools the top of the fire and the exposed brick work.

The modified water gas sets are capable of producing gas with a heat content ranging from 500 to 1000 B.t.u. per cu. ft. The control of B.t.u. in the higher ranges in machines of this type is achieved by reduction in the amount of steam passing through the fire, and by reducing the depth of the fire bed. These reductions result in less hydrogen and CO being formed and the final gas is richer in higher heating value constituents.

Various operators report capacities of twelve foot water gas sets, making 900 to 1000 B.t.u. gas, from 3000 MCF per day to 3500 MCF per day.

2. An operator reports the use of water gas sets modified so as to use only two of the three standard shells.

"The modification consisted of disconnecting the generator from the rest of the machine. This generator is set aside and not used. A tee is installed on the top of the carburettor to which is attached an air and a steam supply. An oil burner is installed in this tee provided with suitable meters, strainers and regulating devices. An oil spray is installed, at an angle, through the carburettor crown outside this tee, in such a way that the spray covers the surface of the checker brick below. The operation of this machine is identical to the twin generator oil gas process, except that only one generator is used. A machine of this kind will produce 3,000 MCF per day or 125 MCF per hour. Checker brick spacing in the single generator oil fired machine is somewhat wider than in the twin generator set. The generators of the twin generator sets are checkered substantially with 1½" spacing and super heaters with 2½" spacing. In the single generator sets, the generator checker spacing is 2½" and the super heater spacing is 3" to 4".

3. Another company reports on the use of a single generator set different from the one described above:

Equipment

"A normal carbureted water gas set was altered by removing the back-run pipe from the base of the generator to the wash box, the back-run steam from the super heater offtake, and also, the natural gas reforming connections. The coaling door lid was removed from the top of the generator and the heating oil burner assembly inserted. No changes were made to primary or secondary air, up-steam connections, carburettor, oil spray or checker brick. The generator grates remained in place and were covered with three rows of staggered checker brick to disperse the air or steam equally. Thermo couples were provided in the top of generator lining, bottom of carburettor checkers and the bottom and top of superheater checkers."

Operation

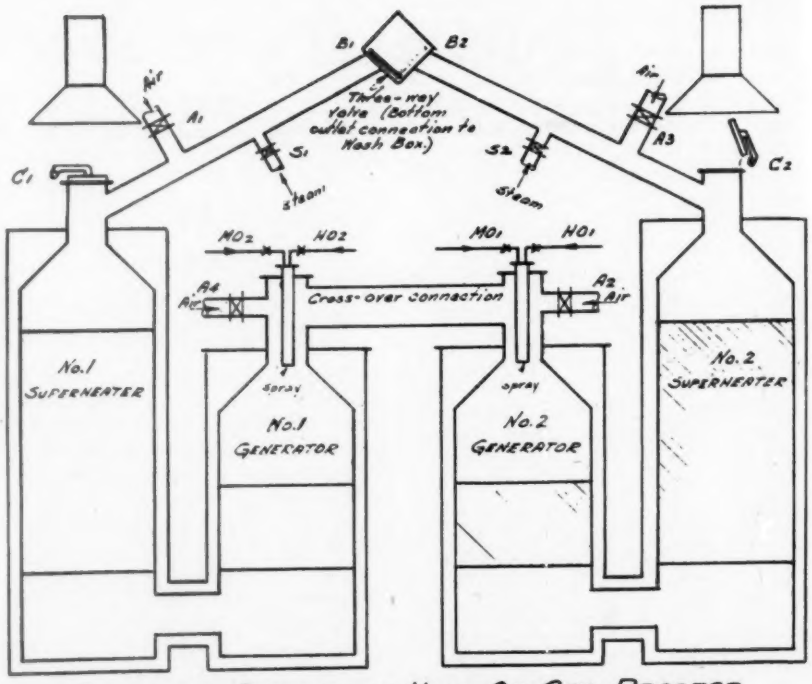
"The heating oil burner is of the steam atomizing type and is ignited initially by an oxyacetylene torch. After the set is hot, ignition is obtained from the hot generator crown. Atomized oil from the heating burner is sprayed from the top of the generator counter-flow to the primary air blown from the bottom of the generator. Secondary air is admitted to the carburettor for complete combustion. After the checker bricks are thoroughly heated, cycle operation is started. The three minute cycle consists of approximately 52 percent heating and 48 percent making. At the end of the blast or heating period, all air is shut off and low pressure steam admitted to the

base of the generator and shortly after, make oil sprayed in the top of the carburettor with the normal spray. At the end of the make cycle, there is a short steam purge followed by a short air purge. It will be seen that it is essentially an up-run process, except for the method of heating. Gas works oil or Diesel oil is used for both heating and making."

4. A manufacturer reports on the work necessary to convert a 3-shell carbureted water gas set to a 3-shell oil gas set as follows:

"The standard angle connection between the top of the generator and the top of the carburettor is removed and these openings bricked up and blanked off with steel flanges. A bottom cross-over connection similar to the carburettor super-heater cross-over connection is installed between the old generator and the old carburettor. These two shells now constitute generator No. 1 and generator No. 2. The grates are taken out of generator No. 1 and arches are installed similar to those in generator No. 2. On these arches are placed ten to twelve rows of high heat storage capacity checker brick. Silicon carbide brick may be used for these checkers since they will supply three or four times more available heat than standard checkers. It is necessary to make changes in the blast line since air for both generators must now come in at the top to provide down blast through the two generators. Top tees are placed on each generator to which are attached blast connection, process and purge steam connections, lighter opening, and a shutter adjustment for distributing blast air so that the heat will be uniform over the cross section of the generators. The top flange of this tee is arranged for the insertion of make oil spray, heat oil burner and the necessary steam purge and steam atomization apparatus.

"Little work is necessary in the old carburettor except for recheckering. Checkering in the generators is usually one and one-half (1½) inch staggered checkering. The super heater is not changed with the exception of its checkering which in this case is two (2) or two and one-half (2½) inch staggered flues. Silicon carbide brick is not used in the superheater even if it is used in the two generators. It may be necessary to enlarge the superheater to seal off-take and make some changes to the seal in order to reduce back pressures. The reason for this is the high momentary rate of make and the higher temperatures of the exit gases. Once beyond the seal, the gases are treated as in common water gas practice. However, more tar is made per hour when making oil gas and this tar has to be handled. Some provision for the increased amount of tar will be necessary. It is possible that oil scrubbing may have to be resorted to for the removal of naphthalenes and gum formers.



SCHEMATIC DIAGRAM OF HALL OIL GAS PROCESS

"The set is brought to gas making temperatures by blasting down through both generators. The products of combustion pass out through the super heater where heat is stored in the checker brick for the subsequent fixing into a permanent gas of the oil vapors produced in the generators. The cycle will vary between three (3) minutes and five (5) minutes, depending on local conditions. Roughly, sixty percent (60%) of the cycle is used for the heating period and thirty-three percent (33%) for the gas making period. The remainder of the cycle is used up by purging or is lost time due to valve changes.

"Heats are carried somewhat higher in the checker brick than is common with water gas practice."

5. The same manufacturer reports on changes which were made to a single shell Williamson Carburetted Water Gas Machine:

"To rebuild this machine for oil gas production, the generator grates were removed in the bottom of the generator and extra strong checker arches installed. The top crown of the old generator was removed as well as the wall above which divided the top chamber of this carburettor and generator. A new dome was put into this shell on which two tees for blasting and oil input were installed. The blast was arranged so that the swirl of the burners had one rotating clockwise and the other counter-clockwise to give control of the distribution of heat over a cross-section of the carburettor and the generator. From the bottom of the single shell, a purge pipe was carried up through the roof for the escape of combustion products. The gas offtake was taken from a point about midway up the purge pipe leading to a standard hydraulic seal separator.

"For all practical purposes, the set ran as well as did 3-shell sets. The quality of the gas could be varied by the same operations used to vary the qualities of a 3-shell set."

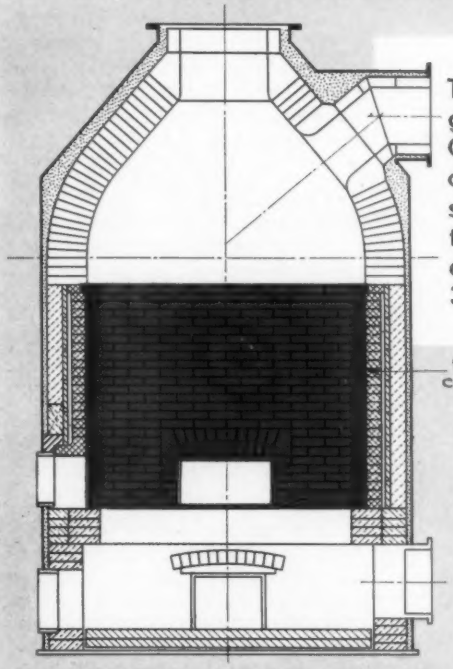
Description of Oil Gas Process At Baltimore

The oil gas process being tested in Baltimore is the one developed by Mr. E. L. Hall and being sponsored by the Research Committee of the American Gas Association.

The machine consists basically of the carburettors and superheaters of two adjoining water gas machines. The former generators were physically disconnected and are not used in the oil gas process. A large cross-over connection was installed between the tops of the two carburet-

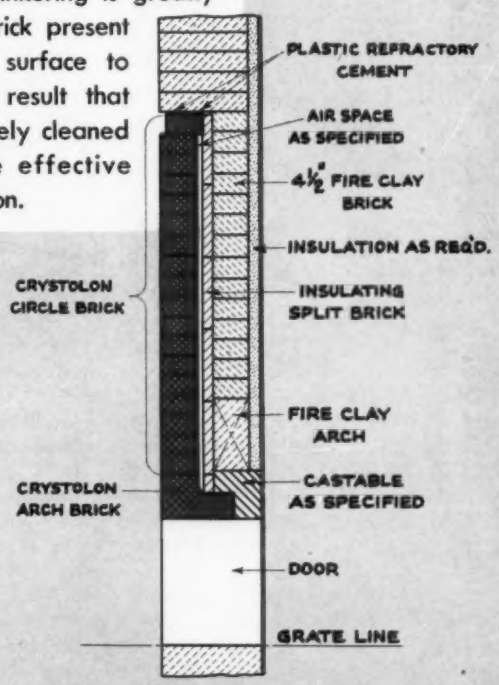
Generator lining pays for itself in One Year... when long-lived CRYSTOLON Brick are used...

The most successful refractory for lining gas generators is silicon carbide which Norton Company manufactures under the trade-mark of CRYSTOLON. CRYSTOLON brick and shapes are helping many plant superintendents in three ways: 1. increased plant capacity; 2, decreased maintenance costs; 3. long lining life.



Sectional drawing of gas generator lined with CRYSTOLON refractory shapes.

When CRYSTOLON brick are used "downtime" for clinkering is greatly reduced. These brick present an impenetrable surface to clinkers with the result that walls are completely cleaned leaving a large effective furnace cross-section.



Cross-section of gas generator wall showing details of refractories including CRYSTOLON interlining.

CRYSTOLON brick decrease maintenance cost by greatly extending periods between repair jobs and by reducing cleaning time. Because of the dense, hard surface of CRYSTOLON brick it is only necessary to break the clinker ring in one place and the entire ring will then fall free. CRYSTOLON linings often pay for themselves the first year by savings in cleaning costs alone.

The results which may be expected from the CRYSTOLON lining will vary with different operating conditions. In some cases, a total operating time of 8000 hours is considered satisfactory. Over 22000 hours have been attained without major repairs.

NORTON COMPANY
Worcester 6, Massachusetts

NORTON REFRACTORIES LIKE HEAT

tors (which are now called generaators). A three-way valve with a bottom outlet to a single washbox was connected to the tops of the superheaters. Combination make oil sprays and heat oil burners were installed at the top of each generator. Air and steam connections were installed as shown on the attached sketch.

The sequence of operations is as follows:

1. *Blast period to heat No. 2 Generator and No. 2 Superheater.*

Stack C_1 is closed, stack C_2 is open and the back run gates are against seat B_1 during this period. Primary air is admitted through valve A_1 to scurf the carbon deposit from the checkers in No. 1 Superheater and No. 1 Generator. Secondary air is admitted through valve A_2 and heat oil is supplied through valve HO_1. At the end of the blast period valves HO_1, A_1, A_2 and C_2 are closed.

2. *Make period in No. 2 Generator and No. 2 Superheater.*

Steam valve S_1 is opened and make oil valve MO_1 is opened to supply oil to No. 2 Generator. The make gas leaves the top of No. 2 superheater and passes through the three-way valve to the washbox. During this period carbon is deposited on the checkers in No. 2 Generator and No. 2 Superheater. At the conclusion of the make period valves MO_1 and S_1 are closed and the three-way valve gates are moved against seat B_2.

3. *Blast period to heat No. 1 Generator and No. 1 Superheater.*

Stack C_1 is opened. Primary air is admitted through valve A_3 to scurf the carbon deposit from the checkers in No. 2 superheater and No. 2 generator. Secondary air is admitted through valve A_4 and heat oil is supplied through valve HO_2. At the end of the blast period valves HO_2, A_3, A_4 and C_1 are closed.

4. *Make period in No. 1 Generator and No. 1 Superheater.*

Steam valve S_2 is opened and make oil valve MO_2 is opened to supply oil to No. 1 generator. The make gas leaves the top of No. 1 superheater and passes through the three-way valve to the washbox. During this period carbon is deposited on the checkers in No. 1 generator and No. 1 superheater. At the conclusion of the make period valves MO_2 and S_2 are closed and the three-way valve gates are moved against seat B_1.

The machine is then ready to repeat step No. 1 above.

It is hoped that the foregoing descriptions will assist those interested in producing High B.t.u. gas in determining what modifications in existing water gas sets would be most advantageous. For instance, a 3-shell oil gas set has approximately twice the production capacity of a 2-shell set of approximately the same dimensions. The cost of modifying a water gas set for twin generator operation is considerably higher than modifying the same set for single generator operation. This added cost can be saved if the production capacity required can be attained with the single generator set.

The lowest modification cost would seem to be that described under No. 3 above. If the tar can be used for heating the set, it would seem that this set has the added advantage of a large combustion space. It may be possible to burn tar in the lower portion of the generator for heat and achieve smokeless operation which is sometimes difficult when using tar as fuel.

Also, at some future date, this generator can be modified as in the twin generator process to increase the capacity of the plant to meet increased demands. This is, also, true when the generator is disconnected from the rest of the set as in No. 2 above. However, disconnecting the generator might result in its being dropped from the rate base. This would not apply where the generator is being used as a "dutch oven."

Most operators will probably find that using a minimum amount of steam, which does not pass through a full bed, will improve set operation. The water gas reaction does not seem to take place to any great extent in the twin generator operation. This can be determined by analysis of the gas produced. A low percentage of hydrogen or carbon monoxide in the finished gas indicates that the water gas reaction is not taking place. If the operator finds a low percentage of hydrogen in the finished gas, he should be able to reduce steam input to the set to that amount necessary for complete purging. Any steam used above the minimum required for purging is unnecessary as it is only being superheated in the set, and results in increased back-pressure in the seal.

One possible method of increasing the efficiency of the oil gas process is the use of tar as the heating fuel. The price obtainable for tar is usually less than the price paid for oil. Tar production will depend on the type of liquid fuel used. With a No. 2 or 3 gas oil, it will be approximately twenty percent (20%) of the make oil used, and this is almost exactly the amount of heat fuel needed. Thus a saving can be made if tar can be used to supply the heat needed to crack the oil.

This paper is not intended to be an operating guide. It is hoped that it will show what certain members of the industry have done to solve some of their problems pertaining to peak loads, and production and distribution capacities.

Acknowledgment is hereby made to the following men whose cooperation made this paper possible:

1. George T. Bentley, Superintendent of Production, Michigan Consolidated Gas Company.
2. Paul L. Covell, Superintendent of Production, Minneapolis Gas Light Company.
3. Frank P. Lamb, Assistant Superintendent of Production, Washington Gas Light Company.
4. Kenneth W. Stookey, President, Gas Machinery Company.
5. John H. Wolfe, General Superintendent, Gas Operations, Consolidated Gas Electric Light & Power Co. of Baltimore.

Presented at the 1948 A.G.A. Joint Production and Chemical Committee Conference, Asbury Park, N. J., May 24-25-26, 1948.

Washington Conference On Gas in National Security

An informal conference in Washington, D. C., May 21, between natural and manufactured gas company executives and the National Security Resources Board, has paved the way for preparations which would assure an adequate supply of gas in event of a war emergency.

Industry representatives agreed to name a committee or committees which would assist the N. S. R. B. in making a survey of gas supplies and estimated demands for the next five years; attempt to cope with bottlenecks facing the industry; carry forward an economic study of the price of gas in relation to the price of other fuels, and study and report on technological developments affecting the gas industry.

Hudson W. Reed, president, The Philadelphia Gas Works Company and the American Gas Association, offered the Association's study of requirements based on normal needs, as a supplement to the Armed Forces' forthcoming estimate of gas needs for defense plant operation.

Recognizing that a bottleneck exists in pipe for transmission lines, Arthur M. Hill, N. S. R. B. chairman, urged that a seven or nine-man committee be appointed to present before Congressional committees the gas industry's case for steel pipe. Alexander Macomber, Boston, Mass., and J. French Robinson, president, The East Ohio Gas Co., Cleveland, were designated to meet with Edward Falck, N. S. R. B., to select this committee.

N. S. R. B. representatives stated that their aim is to assist in removing obstacles to gas industry expansion so that the industry could be of maximum assistance in any emergency, and also to develop proper legislation in this field to meet such an emergency.

A Study of Servicemen's Tools

By

J. R. Larson

Southern California Gas Co.

I. The Manner of Selecting Tools and of Keeping Tool Lists to a Minimum

A. Survey of Tool Usage

SEVERAL YEARS ago the Standards Section of the Customer Service Department was given the general assignment of doing the "leg work" connected with the furnishing of tools, tool containers, truck design, and other related items. The first task undertaken with the tool assignment was to make a survey of the usage of tools furnished at that time. The survey was accomplished by making ride studies with 14 of our best servicemen. A notation on an especially prepared field sheet was made every time a tool was used. A fairly representative cross-section of tool usage was obtained from the survey. We found that 75% of the tools were not being used on 90% of the orders. During the working of approximately 200 orders of all types, 28% of the tools were not used at all.

The results of this survey were reviewed with all interested supervisors in the department, and changes in the tool list were agreed upon. Several tools were removed. Others were altered so as to become more effective, and one or two tools which were found to be needed were added.

B. Selection of Tools as to Type and Brand

About a year ago, through the cooperation of our Tool Depot, we standardized on the tools furnished, both as to type and brand. This was done in order to furnish the serviceman with the particular brand of tool most acceptable to him and to insure the selection of the quality desired. The Tool Depot furnished us a complete kit in which each tool was the exact item that they expected to purchase for future supply. At a meeting of all our District Service Foremen, each tool was presented to the group for discussion and placed in one of three classifications, namely: (1) tools entirely satisfactory; (2) generally satisfactory but would prefer to review before the stock is replenished; and (3) major change contemplated—do not re-order. The tools listed in the latter group were subsequently eliminated from the tool list or were transferred to an optional list and will be eliminated as soon as the present supply is exhausted. Shortly before the supply of a tool listed in Group 2 (generally satisfactory) is exhausted, the Tool Depot notifies us of the fact. A study is then made of this particular tool. Samples of what is thought desired are selected and the facts, together with samples, are presented to the foremen's group for discussion. With their recommendation and subsequent approval of the Operating Manager, the Tool Depot proceeds to furnish the requested tool.

Care must be given to the selection of the tools as to cost, safety, availability, and quality. Complaints on tools must be cared for. These are but a few of the reasons why, especially in a large company, it is false economy not to give a reasonable amount of consideration to the selection and standardization of proper tools.

In order to keep the discussion on a factual basis, this study covers recent experiences related to servicemen's tools within the Southern California Gas Company. The discussion is relative to tools furnished servicemen doing residential service work. This company has had for many years a standard list of tools for servicemen.

C. Preparation of an Optional List to Further Reduce the Number of Tools Supplied

Another recent attempt to keep the basic tool list to a minimum was the separation of our standard tool list into two groups: (1) basic tools and (2) optional tools. We found that because of the tool habits of a few men in each district, we were supplying some tools on our standard list that were never used by the majority of servicemen. These tools were placed on an optional list. All tools on the basic list are issued to a serviceman when he achieves the classification. An optional tool can be obtained then or later in the same manner as used for the entire basic list of tools, i.e., tool loan card with foreman's approval. Servicemen request an average of about 5 optional tools per man.

D. Processing of Suggestions for Additional Tools

Through an active suggestion program* many proposals are received from the servicemen for additional tools and for alterations to the present ones. To treat these suggestions fairly and consistently and to incorporate those which prove worthy, the following procedure has been established for processing of suggested additions:

"Schedule for Handling Tool Suggestions"

I. *Preliminary Investigation by Standards Section:*

A. Review files for previous similar suggestions. If sufficient information regarding suggestions is available in files, submit final answer to suggester.

B. Review suggestion for obvious or controlling factors, i. e., cost, availability, practicability, and frequency of use.

C. Review suggestion with regard to safety practices. If safety is involved, check with Safety Department for approval. If suggestion survives preliminary investigation, the following procedure applies:

II. *Procure tool samples for field test.*

III. *Conduct Field Test:*

Distribute tools among various districts accompanied by letter to supervisors and sufficient copies of

* *A "Proven Employee Suggestion and Field Observation Program" by W. E. Otis, P.C.G.A. Utilization Conference, February, 1947.*

questionnaire to be filled in by each serviceman testing tool. Set time limit on return of tools and questionnaires.

IV. *Summarize results of field test.*

V. *Present summarization of results, recommendations, and samples to District Service Foremen's Group.*

If tool is approved and procurement is requested by the Foremen's Group, Step VI follows:

VI. *Present all available information and data to Operating Manager's Staff for final approval.*

This schedule for handling of tool suggestions has proved to be very satisfactory. The two most important factors of tool selection, namely, the need for the tool and the field acceptance of it, are either verified or disproved.

E. Safety

Safety considerations play an important part in tool supply. A few examples would probably best illustrate this:

1. The hazard of unprotected file tangs was removed by supplying files without tangs. For years we had supplied file handles which were seldom used and which took up valuable space in the kit.

2. Another recent change was the supplying of small rubber fish-hook protectors to be used with the reamers. These are cone-shaped and not only serve as protection from the sharp point of the reamer but can also be used in temporarily stopping off the gas supply when making repairs on range valves, etc.

3. Knee pads, while not a tool, are part of the equipment now supplied all servicemen. Prior to the supplying of these, approximately two years ago, the cost, time lost, and suffering due to knee injuries was a major problem. During the three years prior to that time, an average of one man per year had been totally disabled due to knee injuries. Since the knee pads have been supplied, knee injuries have been almost eliminated. For the first time since accident reports have been kept, the Customer Service Department has had fewer knee injuries than the other operating departments.

These are but a few examples where safety has influenced the choice of equipment supplied servicemen. Our Safety Engineer has, through close coordination with the Customer Service Department, been instrumental in keeping us "Safety" conscious. Safety is of prime importance in tool selection.

F. Development of New Tools

Occasionally a suitable tool for the job is not available and a tool must be developed. Approximately 25 of the tools now supplied are of special design and are made either in our own shops or on order. A typical example of this is the aluminum tool tray which is illustrated in Figures 4 and 5. It was primarily designed for our Servicemen #2. Other examples are the combination soap and dope can, a device for testing B-60 millivolt circuits and controls, the Grayson water heater thermostat wrench, and the hand vacuum pump.

G. Weight Considerations

It has been our experience that as tool kits become heavier due to gradual additions of tools, servicemen are less apt to carry the kits. The tendency is to do the work with tools they are able to carry in their pockets. Only in cases where they cannot improvise with the pocket tools do they return to the truck for the kit. This naturally leads to poor tool habits and often to poor workmanship. In order to encourage the use of the kit by making it as light as possible, the heavier tools have been transferred to truck stock. Our servicemen's new trucks are designed to properly accommodate these tools. A definite place is provided for each tool.

II. Proper Tools for Servicing the Modern Appliance

Although gas appliances have changed radically during the last ten years, the tools necessary to service these appliances have changed only gradually. The clock-controlled range campaigns of the middle '30's here in Southern California may have been partly responsible for larger tool requirements here than elsewhere. During the last three or four years, our own experience has been an actual reduction of the total number of tools on our basic list. However, this is largely due to the removal of obsolete tools, the transferring of others to an optional list, and the combining of tools wherever possible.

Listed below are the tools that we have found necessary to add to our list during the last three years:

1. *Phillips Screw Drivers* (both #1 and #2 points). These screw drivers have become necessary because appliance manufacturers are using an increasing number of Phillips screws in their products.

2. *1/16" Allen Set Screw Wrench.* This was added because certain control manufacturers began to use this size Allen set screw on their controls.

3. *4½" Ignition Pliers.* This item has become increasingly useful for making minor adjustments, such as on difficult to reach top pilot adjustment screws, simmer adjustments, etc.

4. *Servel Manometer Connector Suitable for All Models.* This is an L-shaped steel manometer connector with threads for "S" Model burners on one end and threads for all other models on the other end. The steel threads hold up much better than brass in the tool kits. We have found the L-shape to be necessary for testing pressure on older models of which we have a large number.

5. *Small Screw Driver (1½" Shank, 3/32" Diameter)* to fit small screws found on pilot adjustments where a short shank screw driver is necessary.

6. *6' Flexible Steel Rule.* Primarily supplied to facilitate the correct ordering of appliance parts.

7. *3/16" 8-Point Socket Wrench with an L-Shaped Handle.* This is supplied primarily for adjusting Grayson water heater thermostats, but other uses for it have been discovered.

8. *Hand Vacuum Pump.* This double-action pump (vacuum and compression) was supplied for cleaning pilot lines prior to the installation of filters, but many other uses for it have been found, such as cleaning main burners and pilots on all gas appliances, and, in cases of extreme inaccessibility on the modern range, lubrication of top burner valves.

9. *B-60 Tester* consisting of two flashlight batteries, resistor, and switch, in a wooden case. The output of this unit when connected to a B-60 millivolt circuit is approximately the same as that of the thermopile used with General Control's B-60 valves. This tool has two primary uses: (1) for locating trouble in B-60 circuits and valves, and (2) to be attached to B-60 valves on ranges where a defective thermopile is encountered. Thus, the customer can use her oven or broiler with automatic ignition while the new part is being ordered. Other uses for this tool include opening of B-60 valves on newly installed furnaces to

purge the air through the main burner rather than wait for the air to bleed through the pilot generator.

In addition to the tools mentioned, improved containers for some of the tools and other equipment the serviceman must carry have been furnished.

Conclusions

1. Tool lists for servicemen should be kept standard to insure that all servicemen have the tools necessary to perform the required work safely and satisfactorily.

2. In selecting any given tool, the major points are need for the tool, safety, cost, and, of major importance, what acceptance the tool has with the field men.

3. Periodically the field usage of tools should be surveyed and the tool lists revised if necessary.

4. The serviceman's tool kit should be kept as light as possible. This can be done by removing obsolete tools, transferring heavy, less frequently used tools to truck stock, and by placing tools seldom used but which are considered necessary to some men on an optional tool list.

5. Every tool suggestion should be promptly processed and an answer forwarded to the suggester.

6. The modern gas appliance is forcing more attention on tools, but the quantity of tools supplied for servicing these appliances need not be excessive.

Presented at the Pacific Coast Gas Association, Technical Section, Customer Service Conference, Fresno, Calif., April 1, 1948.

Table of Basic Kit Tools for Servicemen #1

1. Order Holder
2. Oven Thermometer Base
3. Oven Thermometer, 0°-600°
4. Refrigerator Thermometer, 0°-120°
5. Rubber Tubing, ¼" x 14" with End Tubes
6. File, 6", Round Bastard
7. Oil Can
8. Lipstick Type Container for Valve Grease
9. Plastic Container for Petroleum Jelly
10. Manometer Connector for Servels
11. Level—3"
12. Flexible Steel Tape—6'
13. Screw Driver, 4" Phillips #2 Point
14. Screw Driver, 3" Phillips #1 Point
15. Screw Driver, 3" Stanley (No. 20)
16. Screw Driver, 3" Stanley (No. 177)
17. Screw Driver, 1¾" Heavy Duty
18. Screw Driver, 1½"
19. Screw Driver, 1½" Blade, 3/32" Shank
20. Screw Driver, Servel Burner
21. Screw Driver, Offset
22. Flashlight
23. Ball Peen Hammer, 2 oz.
24. Combination Flue Cleaner and Lighter Rod
25. Finger Tool
26. Swab Brush, 13"
27. Large Burner Port Reamer
28. Small Orifice Reamer
29. Large Orifice Reamer
30. Small Burner Port Reamer
31. Orifice Reamer Handle
32. File, 6" Slim Taper
33. Box-End Wrench, 7/16" x ⅜"
34. Wrench, 9/16" x ½" D.O.E.
35. Stove Bolt and Orifice Wrench
36. Wrench, ¾" x ⅝" D.O.E.
37. Furnace Valve Key
38. Mirror
39. Tap, ⅛" Pipe
40. Tap, 5/16" x 32 Plug
41. Tap, ¼" x 28 Plug
42. Leather Drill Case with Drills (Drills vary in Size from No. 32 to No. 80)
43. Center Punch
44. Orifice Expander Punch
45. Drill #3 Straight Shank Twist
46. Large Pin Vise
47. Small Pin Vise
48. Wrench, 3/16" 8-Point Opening Socket
49. Allen Set Screw Wrenches, 1/16", 3/32", ⅛", 5/32"
50. File, 8" Flat Smooth
51. Wrench, 10" Pipe
52. Wrench, 6" Pipe
53. Wrench, 12" Crescent
54. Wrench, 8" Crescent
55. Wrench, 6" Crescent
56. Wrench, 4" Crescent
57. Pliers, 4½" Ignition
58. Pliers, 6" Needle Nose
59. Pliers, 6" Bent Nose

Table of Truck Stock Tools

Hack Saw—8"
Hand Vacuum Pump
Canvas, 3' x 5'
Soap Brush
Combination Soap & Dope Can
First Aid Kit
B-60 Valve & Circuit Tester
Whisk Broom
Claw Hammer
Wire Brush
Hand Drill, ¼"
Cold Chisel, ½"
Garden Trowel
Manometer, 15" (U Type)
Manometer Cone Attachment
Wrench, 14" Pipe
Wrench, 24" Pipe
Hose & Bag for Blowing Services
Furnace Purger (Bellows & Hose)

Table of Optional Tools Most Frequently Requested

1. Wrench, 7" Vise Grip
2. Pliers, 6" Straight Nose
3. Wrench, 8" Pipe
4. Wrench, 7" Special Socket for Small Orifices
5. Screw Driver, 6"
6. Wrench, Reliance Regulator
7. Anvil Orifice Block
8. Lead Block

Servel Develops Floor and Window Display

A new floor and window display for the Servel Gas Water Heater was announced recently by R. J. Canniff, advertising and sales promotion manager for Servel, Inc., Evansville, Indiana.

The display consists of three panels silk-screened in light green, dark green, yellow and white on heavy corrugated board.

The center panel which measures 50 x 56 inches overall includes a life-size cut-out of the 30 gallon Servel water heater with details of the tank, heat exchanger and burner silk-screened in full color on translucent acetate and lighted from behind. The two side panels measure 28 x 45 inches and are equipped with cardboard easels.

The center panel may be used by itself in a small window or with two side panels in larger windows. The entire display set was designed also for use as background for two, three or more Servel water heaters on a sales floor display.

Illuminated 3-Section Panel Display

The flasher translucent cut-out of the water heater provides a dramatic explanation of Servel's exclusive features.

Automatic Overloading of District Regulator Stations

By
Charles C. Jones
Supt. Engineering Division
The Philadelphia Gas Works Co.

THE SUCCESSFUL automatic loading of governor stations is a problem the gas industry has been working on for some years. Some properties have solved the problem to their satisfaction, but I believe a large number of companies have not arrived at the final answer. Unfortunately, the solution in one situation will not function successfully in another, due to differences in pressures, loads and distribution system characteristics.

During the past years, this subject has received the attention of gas engineers; and there are a number of papers available that cover it rather thoroughly. If anyone is interested in the general subject of governor loading, I would suggest they study an article written by William Adams and George Day, and published in "1942 Gas Distribution and Measurement Symposium."

This paper will not attempt to discuss the general subject, but will give a brief resume of work that has been done in Philadelphia.

First, let us look at reasons for governors and then the reasons for loading them. Most distribution systems have developed from a small unit consisting of a gas holder and a network of low pressure mains. Gas is supplied from the holder at the lowest pressure necessary to furnish the most remote customer with satisfactory service. During the periods of heavy demand, the holder governor was loaded manually. As this system of mains expanded and the loads increased in magnitude and concentration, the original unit became inadequate and a second distribution unit was installed. This resulted in some cities having a number of outlying holder stations, each with its distribution system. In most cases, these systems were interconnected. As demands increased and house heating entered the picture, this type of expansion became uneconomical, and in some cases impractical.

In Philadelphia, we have developed a system of high pressure mains, which supply the existing holder stations and about 75 underground governor stations. In general, the governors are arranged radially around the holder stations and so adjusted that the most remote governor cuts in last as the demand increases, and shuts off first as the demand decreases. In this way, during the light load periods, most of the gas is sent out from the holder stations.

Each governor and the main system it supplies becomes a small distribution unit. Concentration of load, mostly house heating, has made some of these units inadequate, with the governor pressures being carried. There are two solutions: reduce the area supplied from the governor by installing an additional governor, or increase the outlet pressure of the existing governor by loading. As the period of inadequacy may be for only a few weeks out of the year, loading seems to be the answer.

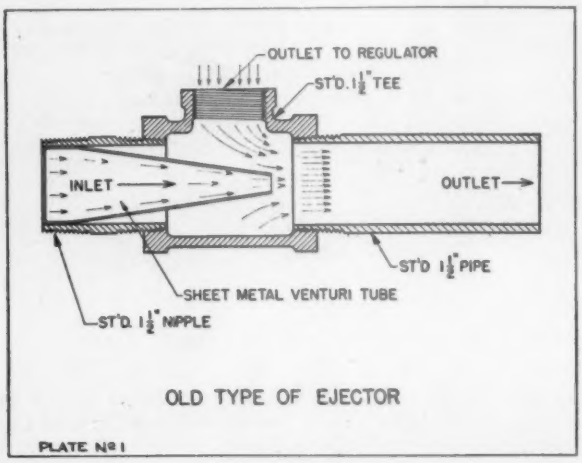
Some of you may ask, "Why not increase the governor outlet pressure?" This would be quite practical in an isolated distribution unit; although more customers would have greater pressure variation; and main leakage would be increased. However, if this governor is one of a group discharging into an interconnected low pressure system, pressures all over the system would have to be increased, even if a large number of the distribution units did not require an increase. This would result in uneconomical operation.

What is required of an ideal governor loader? The loader must be able to increase the governor outlet pressure, within predetermined limits, to carry a minimum constant pressure at the lowest pressure point in its distribution unit; and will not be affected by pressure being carried in an adjacent unit. It also should be of simple construction, easy to adjust, and require little maintenance. These are hard specifications to meet, as a large number of loaders are controlled by the velocity of the gas passing through the governor.

Philadelphia has tried a number of types of governor loaders; some have been discarded as unsuitable, some are in successful operation, and some are still under trial.

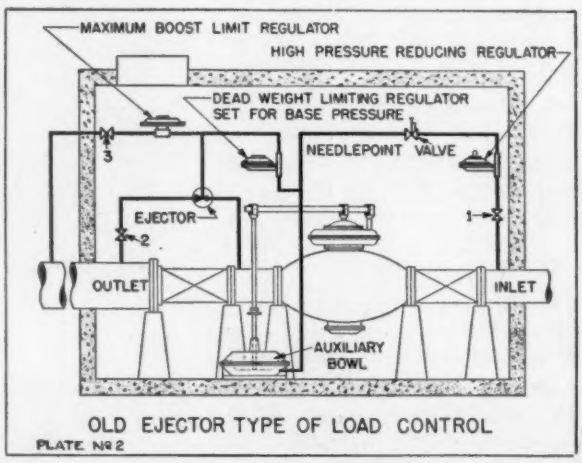
One type of loader was controlled by a time clock. Two low pressure pilot regulators were installed in parallel, one with a high pressure setting and one with a low pressure setting. The clock turned on the higher pressure regulator during the peak load, and then shut it off. This was discarded, as the clock could not tell when the extra pressure was needed.

"Around the block" control was tried and discarded, as the customers on the control main did not have the same gas using habits as the customers we were trying to supply.



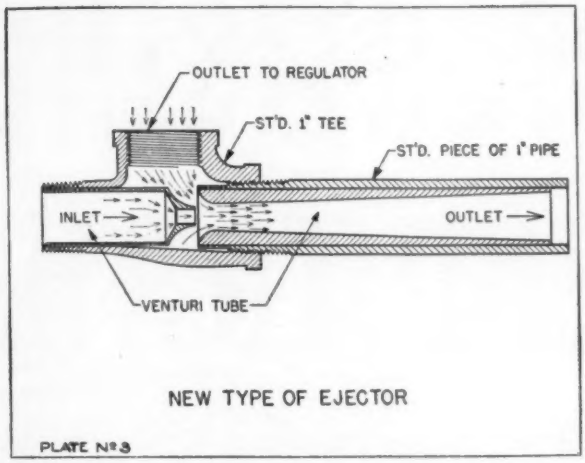
OLD TYPE OF EJECTOR

PLATE No 1



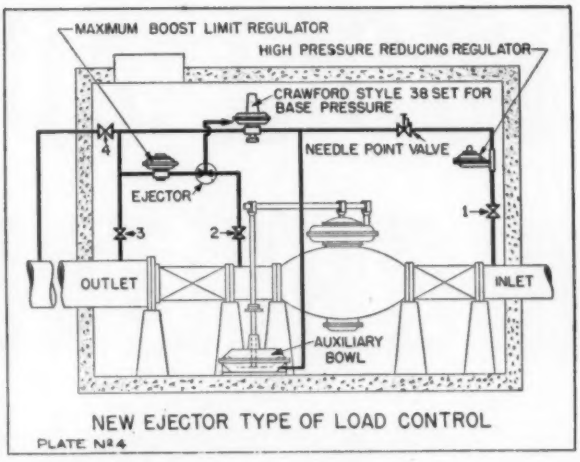
OLD EJECTOR TYPE OF LOAD CONTROL

PLATE No 2



NEW TYPE OF EJECTOR

PLATE No. 3



NEW EJECTOR TYPE OF LOAD CONTROL

PLATE No. 4

Another type of loader was controlled by the movement of the main valve stem of the governor. This would have been successful if the inlet pressure had been constant. Because our inlet pressures vary, the movement of the stem did not reflect directly the quantity of gas passing.

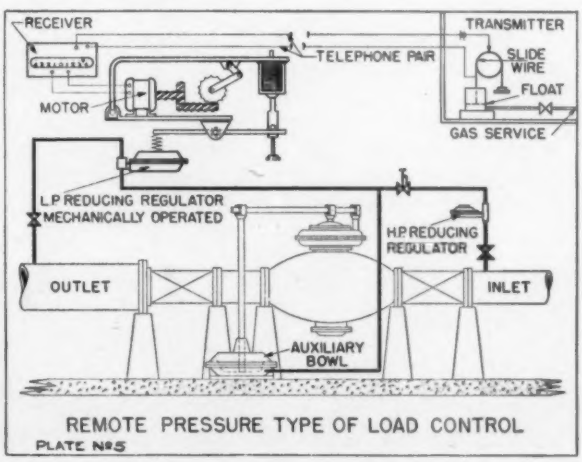
We developed an ejector patterned after a steam ejector to create a false pressure reduction at the outlet of the low pressure pilot. (Plate No. 1). The ejector was installed in a run of pipe around the governor outlet valve, and by partly closing the valve, the desired differential pressure across it could be secured. The side outlet of the ejector was connected to the outlet of the low pressure pilot governor. As the pressure differential across the ejector increased, the pressure at the pilot outlet decreased and the governor opened. (Plate No. 2). This loader only worked well on the large governors with heavy flows.

The Minneapolis Gas Light Company had developed a similar loader with a differently designed ejector (Plate No. 3) connected in the same manner around the outlet valve. The side outlet of the ejector was connected under the diaphragm of the low pressure pilot. (Plate No. 4) We built several of these and find, that when properly adjusted, they are very dependable. When first installed, they caused the governor to "hunt" badly. To correct this, all of the vents, from the different diaphragms were connected to a common header and a needle valve placed in the common vent outlet. By adjusting the needle valve, we partially air bound the diaphragm, which slowed the action of the governor and cured the hunting.

We have one electrically controlled loader which has been in successful operation for a number of years. A transmitter is installed at the low pressure point in the governor area and the receiver is at the governor location. The electrical impulses sent to the receiver control a motor which applies pressure to or removes it from the low pressure pilot. Thus, by increasing or reducing the governor outlet pressure, a constant pressure is maintained at the low pressure point. (See Plate No. 5). The instrument and governor are installed in a building. We tried the loader in an underground manhole, but the damp location developed too many operating difficulties.

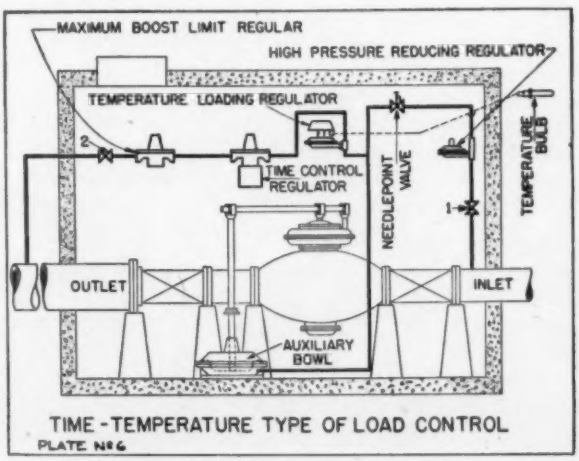
Last fall, we purchased two Fisher's Time-Temperature Controls to try them on our type of governors. This loader was not developed for use with a pilot controlled governor and we were not sure it would function properly. Changes had to be made in the size of orifice and the stroke of the valve. The loader consists of three parts arranged in series; a pilot regulator whose outlet pressure is controlled by a temperature bulb through a capillary tubing connecting the bulb with the regulator; a clock controlled regulator which has a constant pressure setting and may be cut in during the night hours when the load is light; and a regulator set for the maximum loading desired. (See Plate No. 6). We believed that a governor loader controlled by temperature would be suitable for a distribution unit containing a high saturation of house heating. The one loader we had in operation during the past winter worked satisfactorily, and we are now installing a second one on a larger governor.

Presented at the Annual Meeting, Pennsylvania Gas Association, Wernersville, Pa., May 18-20, 1948.



REMOTE PRESSURE TYPE OF LOAD CONTROL

PLATE No. 5



TIME-TEMPERATURE TYPE OF LOAD CONTROL

PLATE No. 6

LOCAL ADVERTISING ON THE TREND TO THE

Your salesmen find more ready prospects . . . when hometown newspaper ads join hands with national advertising

Servel's national magazine advertising is carrying the story of the Gas Refrigerator to millions of families every month. To make this national advertising mean YOU in your community is the job of local newspaper advertising. Right now in particular—just as the refrigerator buying season reaches its peak—a hard-hitting hometown campaign will be of especial value to you and your salesmen!

That's why Servel has prepared a new series of sound, market-wise dealer ads for you. This series—featuring the same basic theme as the national ads—consists of 3 different ads in 4 different sizes (1, 2, 3, and 5 column widths). These ads will work hard for you. They can't help but attract attention and get good readership. The story of Servel's permanent silence, trouble-free service, and longer life is told quickly, with interest . . . and the reader gets a good look inside Servel's big cabinet. (This is about the strongest attention-getting device that can be used in a refrigerator ad.) These new ads will help you cash in on the trend to the Gas Refrigerator . . . and pave the way for both your door-to-door and showroom salesmen.

So don't delay. Get your campaign under way now. If you haven't received your proof sheets and details on Servel's share-the-cost local advertising policy, write to Servel, Inc., Evansville 20, Indiana.

Servel *The GAS Refrigerator*

HELPS YOU CASH IN

GAS REFRIGERATOR!

Large Volume Water Heating

A series of Articles for the Engineer, the Architect, the Salesman and the Contractor. They show how to select and install correct types of Water Heater Systems for specific purposes.

By

Malcolm B. Mackay

The Burkay Company

Initial Installation of Water Heaters and Water Heating Systems—(Continued)

CHAPTER VIII—PART 4

f. RECOVERY WATER HEATING SYSTEMS — (continued.)

(16) Having listed and analyzed, under (14) of Part 3 of this Chapter, the three Responsible Causes for failure of the typical Recovery Type Water Heating System, pictured in Figure 14, to fulfill the *three principal functions* noted in section (13), we can now visualize the obvious changes to this typical lay-out which will result in enabling the equipment to supply the *full, potential capacity* of hot water and to maintain a *uniformly stable* Hot Water Discharge Temperature.

(17) Disconnecting the hot, discharge, recovery circulating line (G) from the line (G-1) and reconnecting it to the center tapping (N) in the left end of the hot water storage tank (B), as shown in Figure 14-A, would only partially correct the conditions responsible for failure of the recovery system, shown in Figure 14, to deliver the full, potential capacity of hot water or to maintain a uniformly stable hot water discharge temperature.

(a) The possibility of a *vapor lock* occurring in the hot, discharge, recovery circulating line (G in Figure 14), as described in 14-(b) of Part 3 of this chapter, will be reduced if not eliminated as this Line (G in Figure 14-A) will not rise above the level of the top of the hot water storage tank (B).

Interruption or suspension of the recovery circulation will be less likely to occur.

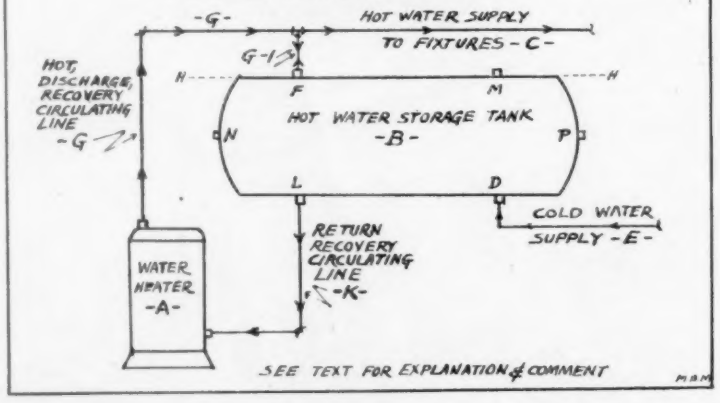
Sacrifice of potential hot water recovery capacity will accordingly be minimized.

Where a tapping is available in the *end* of a horizontal hot water storage tank at a point above the center line of the tank, the hot, discharge, recovery circulating line (G) may be connected to *this* tapping (NN) instead of to tapping (N). This optional connection is, in fact, preferable as the hot water from the heater would be introduced into the storage tank a a higher level.

(b) The possibility of the hot water being delivered *directly from* the Jacket or Tank of the water heater A to the fixtures connected to Line C. will likewise be eliminated. The wide fluctuation in temperature of the hot water delivered to the fixtures, even during periods as short as one minute, (as described in section (15) of Part 3 of this Chapter) will not occur as the hot water will be supplied *from* the hot water storage tank as it should be if the functions of the system listed in section (13) of Part 3 of this Chapter are fulfilled.

FIGURE NO. 14

TYPICAL RECOVERY TYPE WATER HEATING SYSTEM EMPLOYING THE "TWO WAY" PIPE PRINCIPLE AND OTHER DESIGN ELEMENTS DETRIMENTAL TO PROPER FUNCTIONING OF THE EQUIPMENT



We resume in this issue the series of articles by Mr. Mackay which were interrupted due to his illness. The concluding chapters will appear in the August and September issues. We are considering a reprint of the entire series of nine chapters in book form.— Ed.

(c) The *Short-Circuiting* of the so-called recovery circulation between the heater and hot water storage tank will, however, become more aggravated as it will be confined to a pocket in the lower portion of the left end of the storage tank and the displacement flow of cold water from the right to the left ends of the tank will just as effectually prevent the uniform heating of the water in the *right end* of the tank. (See also section (14)-(a) of Part 3 of this Chapter). The impossibility of maintaining a uniformly stable temperature in the water at opposite ends

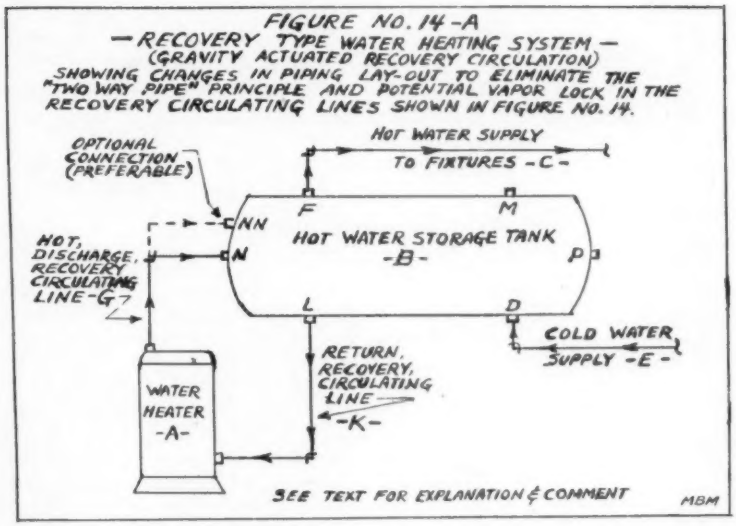


FIGURE NO. 14-A
— RECOVERY TYPE WATER HEATING SYSTEM —
(GRAVITY ACTUATED RECOVERY CIRCULATION)
SHOWING CHANGES IN PIPING LAY-OUT TO ELIMINATE THE "TWO WAY PIPE" PRINCIPLE AND POTENTIAL VAPOR LOCK IN THE RECOVERY CIRCULATING LINES SHOWN IN FIGURE NO. 14.
OPTIONAL CONNECTION (PREFERABLE)
HOT WATER SUPPLY TO FIXTURES -C-
F
M
NN
HOT WATER STORAGE TANK -B-
HOT, DISCHARGE, RECOVERY CIRCULATING LINE -G-
N
P
L
D
COLD WATER SUPPLY -E-
RETURN, RECOVERY, CIRCULATING LINE -K-
WATER HEATER -A-
SEE TEXT FOR EXPLANATION & COMMENT
MBM

of the hot water storage tank (B) and, consequently, in the hot water delivered to the fixtures would be just as great after making the changes shown in Figure 14-A as would be the case with the system shown in Figure 14.

So:—the single piping change described above and as shown in Figure 14-A does *not* correct all of the conditions responsible for failure to provide the full, potential capacity or to maintain a uniformly stable temperature.

(18) Further improvement in the performance of the heater and the functioning of the entire system may be accomplished by *transposing* the connections of the cold water supply line (E) and the return, recovery circulating line (K) to the hot water storage tank (B) and *retaining* the changes described in (17), above, as shown in Figure 14-B.

(a) Connecting the cold water supply line (E) to tapping (L) in the lower, left end and the return, recovery circulating line (K) to the tapping (D) in the lower, right end of the hot water storage tank (B) will result in a *reducion* in the wide differential in temperature of the stored hot water at opposite ends of the storage tank (B) as the recovery flow will move through almost the entire length of the tank.

(b) An additional, slight improvement in the functioning of the system would result from disconnecting the hot water supply line to fixtures (C) from the upper, left tapping (F) and *reconnecting* it to the upper, right tapping (M) in the storage tank (B), (not shown in diagram). The inter-mixing of the water in the storage tank resulting from the direction of cold water displacement flow being from lower left tapping (L) to upper right tapping (M) and the recovery flow from tapping (N) to the lower, right tapping (D) would contribute, to only a limited extent, to the maintenance of a more uniform temperature of the heated water in the opposite ends of the tank.

While there is a slight advantage to be gained by connecting the hot water supply line to Fixture (C) to tapping (M) rather than to tapping (F), it must be recognized that —where the hot water supply line to fixture is connected to a tapping in the top of the hot water storage tank *directly above* the tapping to which the cold water supply line is connected—the cold water *will not* channel upward through the hot water in the upper portion of the tank when hot water is drawn from the tank. Should anyone be reluctant to abandon the theory that the cold water will channel upward through the hot water in the upper portion of the tank, it is suggested that he draw hot water from a tank to which the cold water supply and hot water supply line to fixtures are so connected and *observe* that this does not occur regardless of whether the tank is installed in a horizontal or vertical position. While this is true of all *closed* tanks or vessels it is not entirely true of *open* tanks or other vessels such as Swimming Pools where the recovery flow or movement may channel to the extent that such channelling will be perceptible.

(19) Although the lay-out changes described in (17) and (18), above, and shown in Figures 14-A and 14-B will result in minimizing the possibility of vapor lock occurring in the recovery circulating water lines—reducing the wide variation in the temperature of the heated water at opposite ends of the hot water storage tank—and in eliminating the possibility of a small volume of excessively hot water being delivered directly to the fixtures *from* the jacket or tank of the heater instead of hot water at a *uniform* temperature *from* the hot water storage tank, they will not, however, eliminate the wide variation which will exist between the heated water at the *top* and the water at the *bottom* of the tank.

(a) This wide variation between the temperature of the water at the top and bottom of the Storage Tank results from a condition which is inherent in recovery type water heating systems in which the recovery circulation or *interchange* of water between the heater and the hot water storage tank is motivated or promoted by Thermo-Syphon or so-called Gravity action.

When visualizing so-called Gravity Recovery Circulation, it must be recognized that "Circulation" in its true sense does not exist, but that the interchange of water between the

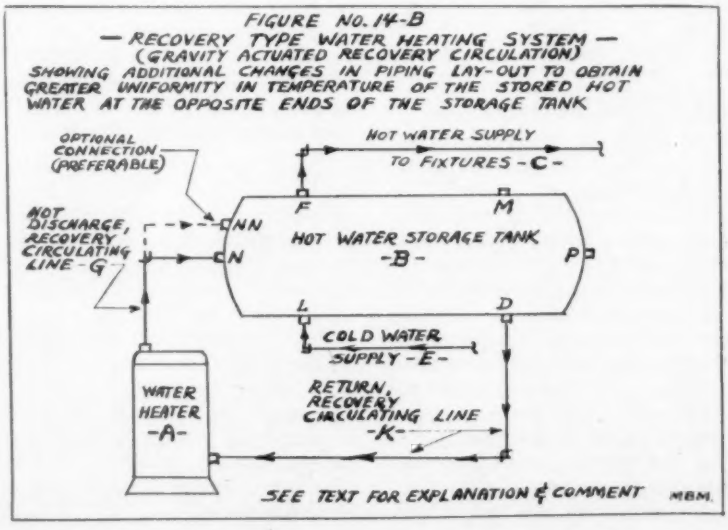


FIGURE NO. 14-B
— RECOVERY TYPE WATER HEATING SYSTEM —
(GRAVITY ACTUATED RECOVERY CIRCULATION)
SHOWING ADDITIONAL CHANGES IN PIPING LAY-OUT TO OBTAIN GREATER UNIFORMITY IN TEMPERATURE OF THE STORED HOT WATER AT THE OPPOSITE ENDS OF THE STORAGE TANK
OPTIONAL CONNECTION (PREFERABLE)
HOT WATER SUPPLY TO FIXTURES -C-
F
M
NN
HOT WATER STORAGE TANK -B-
HOT, DISCHARGE, RECOVERY CIRCULATING LINE -G-
N
P
L
D
COLD WATER SUPPLY -E-
RETURN, RECOVERY CIRCULATING LINE -K-
WATER HEATER -A-
SEE TEXT FOR EXPLANATION & COMMENT
MBM.

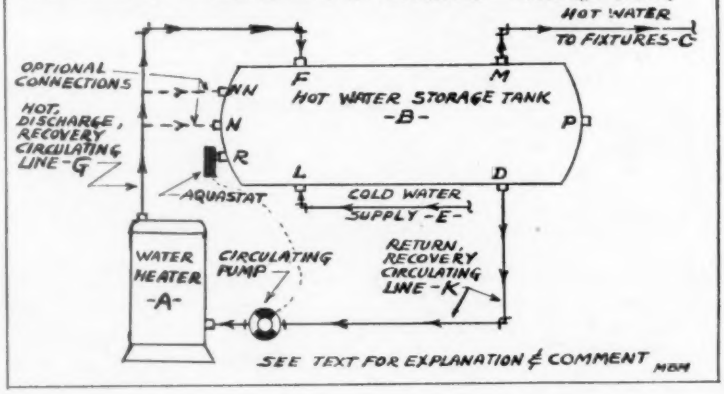
heater and the hot water storage tank involves "Displacement" of cooler water in the tank by heated water from the heater jacket, heater tank or coil and "Displacement" of the hot water in the heater by cold or cooler water from the lower zone of the hot water storage tank. Under such conditions, the Minimum Differential which will exist between the temperature of the water in the top and that in the bottom of the hot water storage tank will *always* be equivalent to the number of Degrees, F., which the water in the heater jacket, heater tank or coil will be *raised* in temperature before the energy developed by the expansion and reduced weight or specific gravity of the water being heated will be sufficient to overcome the fractional resistance to the flow of water through the recovery circulating lines ((G) and (K) in Figure 14-B.) and result in the heated water leaving the heater to be delivered to the hot water storage tank.

It is accordingly obvious that—if the fractional resistance to the flow of water through the recovery circulating lines ((G) and (K) in Figure 14-B) is increased as a result of this piping being *too small* in diameter or having an excessive number of ninety degree elbows or other fittings—the following sequence of events will occur:

> The Rate of Flow or movement of the water through these lines will be retarded—
> The Retarded Rate of water flow will result in retention of the water in the heater jacket, heater tank or coil for a longer period—
> The Increased Length of the period during which the water is retained in the heater will result in increasing the water temperature rise and, consequently, increase the temperature of the hot water delivered to the hot water storage tank to an excessive degree.

It is, therefore, apparent that excessive frictional resistance to the flow of water in the Recovery Circulating Lines may—and frequently does—result in the hot water entering the top of the hot water storage tank at a temperature *above* 200° F. This excessively hot water will accumulate in the upper part of the tank but the temperature of the water in the lower part of the tank *will not* be raised appreciably as the hot and cold water will *remain stratified* in the tank due to the fact that the interchange of water between the heater and hot water storage tank will be on the *displacement* basis as outlined above.

FIGURE NO. 14-C
— RECOVERY TYPE WATER HEATING SYSTEM —
(PUMP ACCELERATED RECOVERY CIRCULATION)
SHOWING INSTALLATION OF CIRCULATING PUMP IN THE RETURN, RECOVERY CIRCULATING LINE TO IMPROVE PERFORMANCE AND REDUCE DIFFERENTIAL IN TEMPERATURE BETWEEN HOT WATER AT TOP AND THAT AT BOTTOM OF STORAGE TANK



Retardation or strangling of water flow through the recovery circulating lines as a result of excessive *frictional resistance* may accordingly be the principal, responsible cause for a differential in temperature of as much as 80 to 120 degrees, *or more,* between the temperature of water at the top and that at the bottom of the hot water storage tank.

Admittedly, this differential could be slightly reduced when the heater in an Automatically Controlled, Gravity Recovery Water Heating System is equipped with a high limit *control* which would function to shut off the fuel to the heater burner when the water in the heater attained a predetermined temperature. It must, however, be recognized that this reduced differential in temperature could be accomplished *only* by sacrificing an appreciable portion of the potential recovery capacity of the heater, as the time during which the gas or other fuel to the heater would be shut-off due to functioning of the high limit control could amount to as much as 50% of the total, available operating time.

(b) We must necessarily conclude that—even under the most favorable conditions—the resulting differential in the temperature of the water at the top, and that at the bottom of the hot water storage tank, will be equivalent to the number of degrees which the water will be raised while in the heater, and that this inescapable temperature differential will effectually preclude the possibility of a gravity actuated, recovery water heating system supplying hot water to the fixtures at a uniformly stable temperature.

(20) The *resulting differential* between the temperature of the water at the top and that at the bottom of the hot water storage tank, which is inescapable in a gravity actuated, recovery type water heating system can, however, be *materially reduced* by employing a High Velocity Circulating Pump to accelerate the rate of flow of recovery circulation or interchange of water between the heater and the hot water storage tank.

This circulating pump — installed in the return, recovery circulating line (K) and actuated by a direct acting, line voltage Aquastat installed in a tapping (R) mid-way between the center and bottom at the left, or cold water intake end of the tank as shown in Figure 14-C — functions to accelerate the *rate* of recovery circulation at such times as the heater is operating to replace hot water drawn from the storage tank. The Aquastat may also be employed as the *master control* to actuate the burner in the water heater.

In contrast to the sluggish rate of flow of recovery circulation in the Gravity actuated, recovery type system, acceleration of the rate of recovery circulation flow in the Pump Forced System results in *reducing* the length of the period during which the water will be retained in the heater.

The reduced length of the period during which the water will be retained in the heater will, in turn, result in *Decreasing* the water temperature rise and, consequently, reduce the temperature of the hot water delivered to the tank. By reducing the water temperature rise in the heater as a result of accelerating the flow rate of the recovery circulation, a reduction of as much as 75° F., may be effected in the temperature of the

hot water delivered to the hot water storage tank.

This may be readily visualized by comparing the temperatures at which the hot water will be delivered to the storage tank in two recovery water heating systems having identical water heaters and storage tanks.

In each instance the water heater has a rated recovery capacity of 120 gallons per hour or 2 gallons per minute at 100°, F., water temperature rise. One system is Gravity circulated and the second has Pump Accelerated recovery circulation.

In the Gravity Circulated system, excessive frictional resistance in the recovery circulating lines is such that the rate of recovery flow is restricted to 2 gallons per minute which will result in the water temperature being raised 100°, F., in the heater. Delivery of hot water to the storage tank at a temperature of 200° or over will accordingly result when the temperature of the water entering the heater from the *bottom* of the storage tank would be 100° F., or over. As the hot water delivered to the storage tank will stratify, the temperature of the hot water delivered to the fixtures from the storage tank may be at, or near, 200° during at least a short period of draw. Should the draw of hot water continue at a rate in excess of the recovery capacity of the heater, however, the temperature of the hot water delivered at the fixtures would, within a comparatively short time, drop to as low as 100° or slightly higher.

A wide fluctuation in the temperature of the hot water supplied by a gravity circulated, recovery water heating system is accordingly inescapable.

In the Recovery System having Pump Accelerated recovery circulation, the flow or inter-change of water between the heater and storage tank would be at an average rate of 8 gallons per minute. At this rate, the water temperature rise in the heater would be reduced to 25°, F., and the temperature of the hot water delivered to the storage tank would not exceed 160°, even at the end of a recovery operating cycle when the water entering the heater from the storage tank would be approaching 135° in temperature.

Pump Accelerated recovery circulation in this typical recovery type water heating system accordingly results in a reduction of approximately 75° in the temperature of the hot water discharged from the heater and the delivery of hot water to the storage tank at a temperature only approximately 25° above the desired end temperature instead of at a temperature which could approach 100° above the desired end temperature in a Gravity Circulated system.

It will accordingly be apparent that *minimizing* the differential between the temperatures of the water at the top and bottom of the hot water storage tank—as a result of employing pump accelerated recovery circulation — will definitely enable the system to furnish hot water at the more *uniformly stable* temperature which the user has every right to expect—in addition to securing an ample volume to supply his requirements.

An added advantage may be gained by employing pump accelerated recovery circulation between the water heater and hot water storage tank. The tank need not be installed above the level of the heater. In fact, where space is at a premium at the location where a convenient flue connection for the heater is available or where centralized location of the heater is desirable, the tank may be located in an adjoining room or other spot where space is available. The storage tank may, if necessary, be located *below* the level of the water heater and may also be installed in a vertical instead of horizontal position.

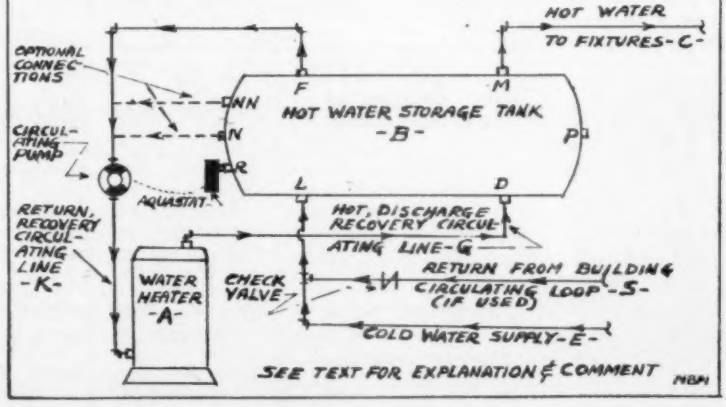
Where the hot water storage tank is located at a considerable distance from the heater, the pipe size of the recovery circulating lines inter-connecting the heater and tank should be increased to compensate for the increased frictional resistance to the flow of recovery circulation which would result, in turn, in increasing both the water temperature rise through the heater and the temperature of the hot water delivered to the storage tank. In this connection it must be remembered that *static head* does not exist, as such, in pump circulated systems where, for convenience, the storage tank may be located below or at a considerable distance above the heater. The heated water flowing either upward or downward through the hot, discharge, recovery circulating line *to the storage tank* compensates or balances the return circulation flowing in the opposite direction *to the heater* in much the same manner as the counter weights in an elevator shaft balance the dead weight of the elevator moving in the opposite direction to result in sufficient power or energy being required to raise only the live load on the elevator and overcome frictional resistance in the mechanism. Greatly increased flexibility of the system is accordingly an outstanding advantage to be gained from the employment of pump accelerated recovery circulation.

(21) While the employment of this method in a recovery type water heating system, as shown in Figure 14-C, will greatly minimize the differential between the temperature of the hot water at the top and at the bottom of the hot water storage tank, it is possible to *further minimize* this temperature differential and preserve a more uniform temperature in the hot water throughout the storage tank and in that delivered at the fixtures.

This greater stability in the temperature of the hot water delivered at the fixtures may be accomplished —in recovery type water heating systems having pump accelerated recovery circulation—by *reversing* the direction of flow of recovery circulation between the heater and hot water storage tank as shown in Figure No. 14-D.

Although this reversal of the direction of recovery flow, which involves delivery of the heated water *from* the heater *to the bottom or*

FIGURE NO. 14-D
— RECOVERY TYPE WATER HEATING SYSTEM —
(PUMP ACCELERATED RECOVERY CIRCULATION)
NOTE THE DIRECTION OF FLOW OF RECOVERY CIRCULATION IS REVERSED OR OPPOSITE TO THAT SHOWN IN FIGURE NO. 14-C.



lower zone of the storage tank and taking the return circulation to the heater *from the top or upper zone* of the storage tank, may be considered somewhat unconventional, it nevertheless has several obvious advantages to recommend it.

In this connection it has been interesting to note the reaction of numerous plumbers and several gas utility men to this departure from the conventional method of interconnecting the heater and hot water storage tank, upon being shown this lay-out for the first time. In the majority of instances the expressed opinion was to the effect that—"it just won't work."

When urged to explain their reasons for thinking it unworkable or not being *superior* to the conventional practice which has been followed since time immemorial without apparent, conscious effort to improve it—the answer almost invariably was to the effect that, since the old or conventional practice had been followed without change for a good many years, it must, accordingly, be correct. In no instance was a valid reason given to support the opinion that *reversal* of the direction of recovery circulation flow would be detrimental or unworkable or that it would not result in minimizing the wide fluctuation in temperature of the hot water delivered at the fixtures and in improving other operating characteristics, particularly of the gravity circulated type of recovery water heating system.

(a) The improved performance—particularly the maintenance of a more uniform temperature of the hot water delivered at the fixtures—may be more readily visualized by directly comparing the operating characteristics of *Two, Recovery Type Water Heating Systems* which employ pump actuated recovery circulation but which are otherwise identical except that:—

In the first system, the lay-out of which conforms to that in Figure 14-C, the direction of recovery circulation flow is of the old, conventional type, while the usual *direction* of flow of recovery circulation in the second system is *reversed* as shown in Figure 14-D.

In each instance the Heater has a recovery capacity of 300 gallons per hour or 5 gallons per minute at a 60° F., water temperature rise equivalent to 6 gallons per minute at a water temperature rise of 50°.

The capacity of each circulating pump is sufficient to maintain the flow of recovery circulation between the heater and hot water storage tank at a rate of 6 gallons per minute under which conditions the water will be raised 50° in the heater at all times *before* being discharged or delivered to the hot water storage tank.

The Tank Aquastat or temperature control which controls *both* the circulating pump *and* the gas or other fuel supply to the burner in the heater is, in each instance, adjusted to maintain a temperature of 140°, F., in the hot water in the storage tank which has a capacity of 180 Gallons.

(b) In the operation of the recovery system in which the pump accelerated recovery circulation flows in the *conventional* direction as shown in Figure 14-C, the following conditions will exist with respect to recovery circulation and tank water temperature:—

Toward the end of a recovery cycle—just prior to the time when the tank aquastat is satisfied and functions to stop the circulating pump and shut-off the gas or other fuel supply to the heater burner—the temperature of the water entering the heater from the *bottom* or *lower zone* of the hot water storage tank will be approaching 140° F., in temperature.

Since the water passing through the heater will be *raised* 50° in temperature at *all times* due to the fact that the circulating pump maintains a *constant* rate of flow of 6 gallons per minute, the recovery flow of heated water will be delivered *to the top or upper zone* of the storage tank at a temperature approaching 190° F., or at a temperature 50° *above* the desired end temperature of the stored hot water. The hot water at this excessive temperature will not, however, stratify in the storage tank to the extent that it will in the storage tank of a recovery system employing gravity actuated recovery circulation since—under the capacity and operating conditions outlined above—a *complete interchange* of water between the heater and storage tank will occur every 30 minutes while it is doubtful whether this complete interchange of water would occur oftener than every 90 minutes in a recovery system employing gravity actuated recovery circulation.

(c) In the operation of the recovery water heating system in which the direction of flow of recovery circulation between the heater and hot water storage tank is *reversed* as shown in Figure 14-D, the following conditions will exist with respect to the recovery circulation and tank water temperature:—

Toward the end of a recovery cycle—just prior to the time when the tank aquastat is satisfied and functions to stop the circulating pump and shut off the gas or other fuel supply to the heater burner—the temperature of the water entering the heater from the top or upper zone of the hot water storage tank will *likewise* be approaching a temperature of 140° F.

As the water passing through the heater will *also be raised* 50° in temperature at *all times* due to the maintenance of a *constant* rate of flow of 6 gallons per minute by the circulating pump, the recovery flow of heated water will *also* be delivered to the *bottom or lower zone* of the storage tank at a temperature approaching 190°, F. toward the end of a recovery cycle or at a temperature 50° F., *above* the desired end temperature of the stored hot water.

Delivery of the heated water—at a temperature considerably *above* the desired end temperature of the stored hot water—to the *bottom or lower zone* of the storage tank will result in this excess of temperature being diffused or transferred to the cooler water in the lower zone of the tank by actual inter-mixing as the pump forced flow of heated water moves upward and toward the opposite end of the tank before again returning to the heater. Reversal of the direction of flow of recovery circulation will accordingly accomplish practically simultaneous heating of the water throughout the hot water storage

(Continued on page 50)

IT'S NEW! IT'S DIFFERENT!

THE REPUBLIC *Self-Cleaning* **DUO-WAY**

Here is the convenient and practical disposal unit with the revolutionary 2 *ZONE* principle that everyone is talking about.
Because this amazing appliance has not just one, but *TWO* big zones (one designed specifically for drying and the other for burning) it not only completely eliminates wet garbage and other waste matter easily, economically and without offensive odor, but *automatically cleans itself as well.* A.G.A. APPROVED.

Additional Information Available Upon Request

AUTOGAS COMPANY 2151 W. Fullerton Ave., Chicago 47, Illinois

High Pressure Gas Storage

AT THE MEETING of the Technical Section of Pacific Coast Gas Association held at Monterey, California, May 5-6, the subject of underground high pressure storage in a network of 40-foot tanks* was presented and illustrated with slides by G. Lawton Johnson of National Tube Company.

Webster's dictionary, he said, defines logistics as a military term meaning "that branch of the military art which embraces the details of the transport, quartering and supply of troops." The term, in the opinion of the writer, is applicable to the study of problems involving the transport, storage and supply of gas between gas fields and the consuming public.

A favorable balance is indicated between presently known natural gas reserves and yearly net consumption. To maintain this ratio of reserve to production, further exploration and development are necessary. The growth of the natural gas industry has been steady during the past ten years and, since the war, demand for pipe lines has increased tremendously. Since the availability of material for additional pipe lines does not appear favorable for the immediate future, so other means must be taken to help solve the problems to get enough gas at the right place at the right time.

Operating public utilities are under obligation to maintain residential service at all times and as this load increases the responsibility becomes greater. A group of major operating utilities in the Midwest are endeavoring to solve a part of this problem by increasing their emergency facilities close to the point of consumption.

This group made a careful study of the various types of storage available, such as Hortonspheres, low pressure holders, liquefied natural gas, increased manufactured gas capacity, and other types of storage. They adopted the use of storing natural gas under high pressure in seamless steel bottles.

The storage of gas under high pressure in seamless steel bottles was selected for the following specific reasons:

1. It represents the lowest over-all cost.
2. Has a maximum safety factor.
3. Offers the lowest maintenance and operating cost.
4. Provides availability, simplicity and speed of installation.
5. Creates flexibility of capacity by expansion of facilities.
6. An immediate large volume of pressured gas is on hand.

Mr. Johnson next described and illustrated by slides a typical type of underground high pressure storage installation, consisting of a network of buried tanks. Each tank is 40 feet long, 24 inches in diameter. Each length of pipe can provide storage for 25,000 cubic feet of natural gas at a pressure of 2240 psi. These bottles are manifolded together with small diameter pipe.

The installation is coated and cathodically protected to prevent external corrosion.

Mr. Johnson stated that the storage of gas in high pressure cylinders is the most modern and up-to-date method known. Underground high pressure storage has a great many advantages from an economic, esthetic and practical point of view.

Gas Logistics is a study not only of supply and demand, but of transportation, storage, emergency backlog, and of the heavy responsibility resting on the public utilities to service the public.

GAS HEATING RESTRICTIONS DO NOT EFFECT THE USE OR SALE OF GAS HOUSEHOLD APPLIANCES OTHER THAN SPACE HEATING

Since our announcement of the necessary continued restrictions against accepting additional gas space heating for the coming heating season, many customers have inquired as to how this affects other uses of gas.

Gas ranges, water heaters, refrigerators, laundry dryers and waste incinerators are not affected. Employed for their intended purposes, these appliances use no more gas on a zero day than on any average winter day. Thus, they do not create peak demands for gas on the zero days when heating gas is at a premium.

The average family can cook or refrigerate with gas for 60 days with approximately the same amount of gas needed to heat one home on one zero day. By like reasoning, water heating with gas can be accomplished for 48 days with this amount of gas.

The large majority of sales of gas ranges and water heaters goes to replace outmoded equipment. If the user does not increase his demands on the new appliance, he likely will save gas through its improved efficiency over the old

Such appliances constitute what we call our "base load," with somewhat steady demands for gas the year 'round. It is this year 'round use of gas that helps hold down the cost, and offers supporting reasons for our contracting huge additional amounts of gas for the years ahead.

Furthermore, the gas heating restrictions do not affect the sale of replacement gas space heating equipment, providing the new equipment does not exceed the capacity of the equipment replaced. Modernization of old gas space heating equipment often gives better heating service with a reduction in amount of gas used.

One of the purposes of the recent continued restrictions in the use of gas space heating was to protect the service to those who depend on gas for general household purposes, as well as those already using gas for space heating. The relatively small additions in gas supply in the picture for next winter should offer improvements in service over last winter even with the same severity of weather.

THE OHIO FUEL Gas Company

One of the 3-column newspaper advertisements of Ohio Fuel Gas Company gives the public the facts on appliance installations in their territory. Gas heating equipment may be installed for replacement, provided increased capacity is not required. Other appliances are not affected by the restrictions. Original size 3 col. 10" high.

For perfect purification
... IRON SPONGE

When it comes to purification, gas producers rely on Iron Sponge for a really thorough job. Uniform high quality and proven economy have made Iron Sponge the leader among gas-purification materials for over 73 years. Extra high activity and capacity, longer periods between necessary revivings, fast comeback after fouling, low first cost and low maintenance, minimum operator attention—these are the advantages that have made Iron Sponge the choice of the gas industry. Whatever your purification problem, consult Connelly. Our experienced engineers and laboratory facilities are at your disposal.

CALOROPTIC

A simple, inexpensive instrument for continuous direct readings and BTU control applied to manufactured, natural, propane, and butane air gas.

SMYLY H2S TESTER

A patented device for quick, accurate tests using pre-treated paper discs.

CONNELLY pH TEST KIT

A complete simple outfit for making pH determinations. Includes universal indicator solution, test tubes, color chart and full directions. Handy 3″ x 5″ pocket carrying case.

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4 INSTALLATION POSITIONS

...for easy connections
Spring Top operates pointing either up or down

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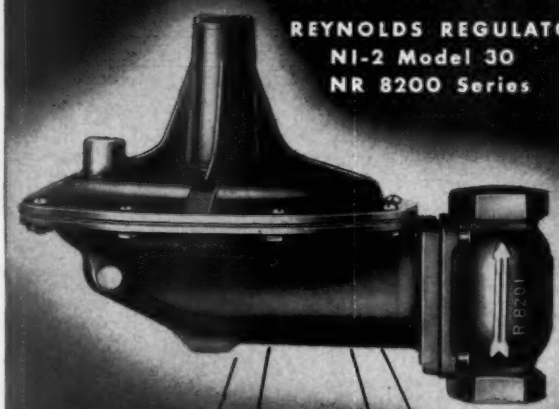
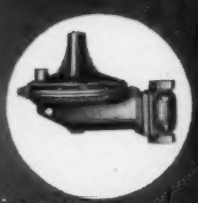
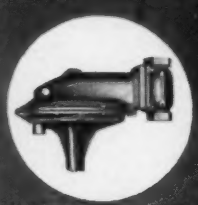




Vertical Position with down flow

Vertical Position with up flow



Inverted Position for use where accumulation of water is problem

Horizontal Position with flow left to right or by changing setting 180° with flow right to left

1. This regulator is available with any type seal previously made by Reynolds.
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3. May be installed in any position on a 90° setting.
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Recent Court Decisions
Affecting Gas Utilities

New Explosion Law Suits

By
Leo T. Parker
Attorney at Law
Cincinnati, Ohio

RECENTLY, a reader wrote, as follows: "We have an important law suit on our hands which was brought by a gas consumer whose home was destroyed by a gas explosion. He claims that we are liable without a jury trial because our gas line was broken outside his house and he notified us of the fact and before we fixed it the explosion occurred. Please give the law on this."

The doctrine res ipsa loquitur may be applicable in your case. This doctrine is used when it can be *assumed* that a gas company *is* liable for damages caused by a gas explosion. In other words, if the testimony is such that reasonable and prudent persons can with much certainty decide that loss or injury was caused by negligence of the gas company's employes this doctrine is applicable and the company will be held liable without further testimony. However, according to a recent higher court the application of the res ipsa loquitur doctrine should be confined to cases where explosion is *known* to have been caused by gas negligently handled by employes of the gas company.

Briefly, let us assume that the gas which caused the explosion in your consumer's home leaked from a pipe which you controlled and had a legal duty to repair, and that you delayed an unreasonable period of time to repair the leak after being notified by the consumer that the leak was present. Now, assuming that the consumer proves that the explosion was caused by gas which escaped from this leak into your basement the doctrine res ipsa loquitur is applicable.

On the other hand, the doctrine is *not* applicable if the consumer fails to prove that the explosion was caused by gas; or that the gas leaked from pipes your company was legally obligated to repair; or that your employes negligently failed to repair the leak after receiving your notification.

For illustration, in Holloway v. Skelly, 68 Fed. Supp. 129, reported January, 1947, a property owner sued a gas company for $13,500 damages claiming that under the doctrine of res ipsa loquitur the gas company should be held liable.

This property owner testified that his building caught fire about one hour after the gas company's employes had repaired certain gas leaks in the building. In holding the gas company not liable, the higher court said:

"In this case the question whether the fire was occasioned by a leak in the distribution system is wholly speculative and conjectural. The fire may have been occasioned from many things other than an accumulation of gas."

However, the property owner did *not* in this suit prove positively that the fire started from accumulation of gas. Therefore, the court held the doctrine res ipsa loquitur not applicable. In holding the gas company not liable this court said that in cases of this kind the property owner cannot recover damages if he fails to prove all alleged facts.

The property owner appealed to a higher court and introduced testimony which proved that the fire *was* caused by gas, which escaped through negligence of the gas company's employes. Hence, this higher court reversed the first decision and held the gas company liable. This court said:

"The conclusion seems inescapable that the company was responsible for the conflagration by reason of negligence of its employes."

For comparison, see Mrdalj v. Public Service Company, 31 N. E. (2d) 978. Here the testimony showed that a state law provides that gas companies shall not shut off gas for the purpose of making an inspection of its lines and mains.

One day a property owner complained to an official of a gas company about the odor of gas in his home. The company made *no* investigation, nor attempted to make any repairs. Soon afterward the property owner was killed when gas exploded. Suit was filed against the gas company and proof was given that the gas had leaked from a service pipe over which the gas company had control.

The gas company officials attempted to avoid liability on the grounds that the above mentioned state law prohibited the company from shutting off gas to make an inspection. However, the higher court held the company liable, and held:

"Where a gas company had been notified of odor of gas before explosion, which killed owner of property, the gas company could not defend on the ground it was prohibited from shutting off gas to make inspection, since where gas company has knowledge that gas is escaping in a building occupied by a consumer it is the gas company's duty to shut off gas supply until necessary repairs have been made."

Jury Must Decide

Considerable discussion has arisen from time to time over the legal question: When may a higher court reverse a lower court's verdict and order the case retried before a jury? The answer is: Whenever the testimony does not disclose the exact cause of an explosion of gas; as whether the explosion was caused by gas, or whether the gas corporation's employes were negligent, the higher court will authorize a jury to decide these various conflicting issues.

For illustration, in McGaugh v. City of Fulton, 205 S. W. (2d) 547, reported January, 1948, the testimony showed facts, as follows: McGaugh and his family were tenants in a frame house which had a full concrete basement with four windows and were kept closed. The McGaughs had lived in the house ten days when McGaugh went to the

basement with a lighted cigarette in his mouth and, immediately upon his entering the basement, there was a terrific explosion which injured him and damaged the house. The house was raised off the foundation and the floors collapsed. No one had previously detected an odor of gas in the basement and once or twice prior to the explosion the McGaughs had done the family washing in the basement, using a coal oil stove. McGaugh sued the city, which owned and operated the gas plant and sewage system.

During the trial the testimony showed that the city sewer line terminated in a dead end almost in front of the McGaugh house. There was no manhole at the dead end sewer, but there was a lamphole of tile covered with an iron cap. There was evidence that all the manhole covers were perforated or contained holes but the holes were *all closed* up with asphalt paving and had been for some time. There was *positive testimony* that the holes in manhole covers served the purpose of venting them, to allow the "escape af air and gas from the sewer and also allow the introduction of fresh air into the sewers."

McGaugh contended that the explosion resulted from collection of sewer gas not permitted to escape from the sewer because the holes in the manhole covers were allowed to remain stopped up. This contention was made because an examination of pipes leading into the house and also valves showed that none of the lines leaked gas. Furthermore, McGaugh proved that at no time in the past had there been even slight odor of escaping gas in the basement. The counsel for the city denied that the explosion could have been caused by accumulation of sewer gas. The lower court held the city not liable. However, in view of conflicting testimony the higher court reversed this verdict stating that a jury should decide whether the city is liable. This court said:

"We may also assume, for the purposes of this opinion, that it is a matter of general knowledge that sanitary sewers contain gas, some of which is explosive when mixed with air and exposed to some kind of ignition . . . While liability for negligence may not be predicated upon hindsight, nevertheless the city may have been bound to anticipate, if it were negligent with respect to its sewers and any gas in them, that such negligence might result in gas escaping from its mains into a basement through improper house installations or through an uncapped cleanout pipe . . . Since it appears that the plaintiff (McGaugh) may be able to adduce evidence, hypothetical or otherwise, demonstrating causal connection, the judgment is reversed."

Also, see Butler v. Civic Gas Company, 184 Pac. (2d) 983, reported December, 1947. In this case the testimony showed that a WPA workman when operating a motor grader to which was attached a scarifier, broke a pilot line which controlled the gas pressure in a service line leading to a consumer's home. The breaking of the pilot line then greatly increased the pressure and flow of gas in the service line. The pressure and volume of the gas resulted in a fire which destroyed the consumer's home. He sued the gas company for damages.

During the trial the uncontroverted testimony was that in 1939 the City of Atoka granted a franchise to the Civic Gas Company which, among other things, required the Gas Company to lay all its gas lines 18 inches below established grade of the streets, avenues, and alleys as then or thereafter established. Later in that year gas lines to service the citizens with gas were laid throughout the city, and gas was furnished under the franchise. Certain witnesses testified that from their investigation, observations, and measurements made immediately after the line was broken, the pipe line at that place was only six or seven inches below the surface of the street and that the pilot line was about three inches above the main line. Other witnesses testified that the street under which the pipe was broken had been dragged and run over with a grader frequently during the period of time between the laying of the line and the time it was broken. The lower court held the gas company not liable but, in view of conflicting testimony, the higher court reversed the verdict and ordered a jury trial, saying:

"The evidence is uncontradicted that when and where the gas line was broken by the scarifier it was found to be not more than six or seven inches below the surface of the street . . . Obviously the jury, in order to find the Civic Gas Company guilty of negligence could do so only by finding as a fact that the pilot line, when laid, was not placed 18 inches below the surface of the street at the place where it was broken."

Leak Discovered After Explosion

It is well known that although there is *positive* evidence that a gas leak in a gas company's line caused an explosion, with resultant damage to private property, this evidence alone is not enough to justify a jury holding the company liable in damages. The testimony must indicate that escape of the gas was due to *negligence* of the gas company's employes. Otherwise the company is not liable.

On the other hand, the court may *imply* negligence.

For illustration, in Prudential v. United Gas Corporation, 199 S. W. (2d) 767, the testimony showed facts, as follows: The building in which an explosion occurred was a business building.

At the time of the explosion the gas company was furnishing gas for an adjoining Piggly Wiggly store.

The cause of the explosion, stated

CRUSE-KEMPER COMPANY
AMBLER, PENNA.
GAS HOLDERS
Low Pressure High Pressure Inspection
Purifiers Tanks Flues
Over 40 Years of Sound
Steel Plate Construction

by the property owner was a leak in an outside gas service line installed by the gas company in 1926 underground, and which was connected to both the destroyed building and the adjoining Piggly Wiggly store.

The building owner contended that the evidence showed a leak developed in the line where the riser was screwed in; that the escaping gas seeped through the wall, and its cracks and services, and accumulated in a pocket; and that after the explosion and after an excavation had been made against the wall on the outside at the riser, it was disclosed that the source of the leak was at the point where the riser and tee joined. An expert testified that when the gas company men had dug down 12 or 15 inches almost to the pipe the escaping gas blew the dirt back; and that after the broken pipe was replaced there was no further odor inside or leakage into the building.

The gas company's counsel denied liability on the ground that its employes had placed and installed the Piggly Wiggly line according to the best customs and uses; it had no notice that gas was leaking prior to the explosion; and that the line was inspected at intervals, and if in a leaky condition the acts of some third person had caused it.

The lower court held the gas company not liable, but the higher court reversed this verdict, saying:

"It was conclusive that a leak was discovered in the Piggly Wiggly line after the explosion, and it is not disputed that the gas was cut off from the Henderson building line by the gas company immediately thereafter."

Hence, in this case the decision was based on the testimony that the gas company, being engaged in the business of distributing a highly explosive and dangerous article, was negligent in installing and maintaining the Piggly Wiggly line underground too near the damaged building and in not making adequate inspections to know whether the line leaked gas.

Consumer Is Negligent

It is well established law that neither a gas company nor a municipality, which operates a gas system, is liable in damages for explosion of gas unless the testimony proves conclusively that the explosion resulted from negligence of the corporation's officials or employes. And, conversely, proof that an explosion of gas was caused by negligence of a consumer makes the consumer entirely responsible, thus relieving the corporation from liability. This rule of law is applicable to all injuries caused by gas.

See Ruth v. Hutchinson Gas Company, 296 N. W. 136. Here it was shown that a gas consumer died from carbon monoxide poisoning because he failed to provide adequate ventilation in his home. His dependents sued the gas company for damages. However, since his own negligence resulted in the death, the higher court refused to hold the gas company liable saying:

"Carbon monoxide gas is colorless and to most people practically tasteless and odorless. Hence, if one of them negligently closed the ventilator . . . the question of contributory negligence does not require extended discussion."

Also, see Cornett v. Georgia Utilities Company, 11 S. E. (2d) 68. Here it was disclosed that the pipes and vents connected with a water heater were *not* installed by the gas company, but were installed by the consumer.

One afternoon the consumer was overcome and rendered unconscious for several hours as a result of inhaling carbon monoxide and kindred gases which had escaped from the gas water-heater. He sued the gas company.

It is interesting to know that the higher court refused to hold the gas company liable, and said:

"There was no duty on the defendant (gas company) to inspect the gas water-heater and pipes and vents connected therewith, as they were owned and controlled by the owner of the building or the occupant thereof, and not by the company."

Caine Joins Texas Eastern as Secretary-Treas.

Walter E. Caine is resigning as director of the Bureau of Statistics and secretary of the Accounting Section of the American Gas Association to become secretary and treasurer of Texas Eastern Transmission Corporation, according to a joint announcement by H. Carl Wolf, managing director, A.G.A., and R. H. Hargrove, president of Texas Eastern. He will assume his new duties August 1 and will be located in the company's headquarters at Shreveport, La.

While at A.G.A. Mr. Caine reorganized and expanded the work of the Bureau of Statistics and directed an enlarged program of statistical analysis and market research. At the same time, he directed the comprehensive activities of the Accounting Section. He was also active in the work of the Rate Committee and served as secretary of both the Committee on Economics and the Committee on Natural Gas Reserves.

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Training Program for Utility Car and Truck Drivers

By

Fred A. Herr

WHAT the Southern California Gas Co. of Los Angeles has accomplished in the formulation of an effective program for the training of drivers of company cars and trucks is discussed in a recent report prepared by A. R. Grant, supervisor of automobile maintenance, of that utility.

The program outlined by Mr. Grant, and which was recently approved for adoption by Southern California Gas Co. management, offers a practical driver training program, geared to the economics of gas utility operation. Mr. Grant declared in his report that while gas industry groups and many company committees have frequently discussed driver training without accomplishing anything definite, the Southern California Gas Co. has, in his opinion, arrived at a practical and economical system of driver training.

Mr. Grant pointed out that most recommended driver training programs start with a driver selection process which usually consists of visual, physical and psycho-motor tests to determine that the man is physically suited for the job of driving. After this, he declared, the person selected to drive is given a complete course in the mechanics of handling an automobile. He is then instructed in the various laws and ordinances so that by the time he has finished with his training, he is, theoretically, a safe and effective driver.

Mr. Grant pointed out that the American Trucking Association has obtained good results with giving truck drivers merchandise prizes on the basis of points earned through accident-free and effective driving. The cost of the full A.T.A. program, the report brought out, was found to be above $60,000 per year for the Southern California Gas Co., which operates a fleet of some 1500 motor vehicles. For economic reasons, the company found it impractical to use the full treatment recommended by the trucking association. The company officials likewise questioned the value of certain phases of the A.T.A. training program, which dealt with the awards of prizes and the use of psychological or psycho-motor testing treatments.

The program adopted by the gas company is based on a study made by company safety and maintenance authorities and geared to the specific needs of the utility and its type of fleet. The formulation of a driver testing program was recommended by Southern California Gas Company management in the fall of 1947. Mr. Grant and Albert W. Turner of the company's safety division, collaborated in preparing a proposed program. Their tentatively recommended summary of driver testing procedure, Mr. Grant reported, was subsequently used as the basis of the program ultimately authorized for adoption by the company.

The summary proposed to management by Mr. Grant and Mr. Turner was as follows:

"The objective of any driver testing program (they stated) is to bring about more careful handling of automotive equipment to the end that:

1. . . Accidents will be reduced.
2. . . Claims cost will be lowered.
3. . . Equipment will be conserved for longer life and less repair costs.
4. . . Employee personal injuries will be minimized.

"Indirect corollary benefits, such as better public relations, better employee relations, a sense of security which accompanies an exceptionally good automobile record—all of these, and other benefits follow a successful testing program. The word "testing" is used in a broad sense to include certain tangential changes in company policy, such as in the method of reporting accidents, in accident investigation, in supervisory-driver relationships, etc.

1. . . . Vision Testing.

"The first and most important test is that of vision. This may be done with the Keystone tele-binocular, a simple rod test, and a perimeter.

"The purpose of the Keystone tele-binocular as to discover whether or not the employee has adequate vision for driving. This machine will show the degree of near and far vision, tendency to "tunnel" vision, muscular imbalances, astigmatism, myopia and hyperopia.

"The rod test demonstrates practical depth of vision. Its chief value is in demonstrating to the person being tested that he may have to allow leeway in certain driving situations because of inability to judge effectively the nearness of approaching vehicles.

"The perimeter is a simple method of determining lateral vision. Its purpose is to demonstrate to the person being tested his ability to see a full 90 to 100 degrees laterally while looking ahead. This is an important test for many people who are unable to see more than 60 degrees laterally out of one or both eyes.

"The purpose of the vision test is not to screen out employees for visual defects. Its purposes are:

1. To discover employees having inadequate visual acuity so that they may have their own doctor prescribe adequate corrective glasses.
2. To assist employees who have non-correctible defects, such as "tunnel" vision, inability to judge distance, lack of lateral vision in one eye, non-correctible unilateral lack of acuity, so that such employees may compensate for these defects by simple little habits such as turning the head slightly to correct for inadequate lateral vision, giving extra clearance for poor distance, judgment, etc.

"In the event that an employee is discovered who simply cannot see, and whose vision is not correctible, it would be desirable to clear such an employee through the company's chief examining surgeon for placement in a non-driving job. This is the only situation where drastic action would appear necessary."

2. . . . Good Driving Practices.

"In addition to the vision test, the driving employee should be made thoroughly familiar with certain fundamental good driving practices. These practices should be few in number and should consist largely of a composite of the Interstate Commerce Commission's recommendations and the California Vehicle Code 'Rules of the Road' section.

"They should be printed and distributed to all drivers. The drivers should be required to learn them thoroughly. Periodic tests should be given, either in company safety meetings or informally by the supervisor, to make certain that these basic driving practices are generally known."

3. . . . Road Test.

"The third phase of the program should be a demonstration on the part of the employee that he is competent to operate the vehicle properly. This check should be made by the employee's supervisor and should consist of a check ride with the supervisor observing the employee's driving practice and noting his failures. If the employee is not competent to perform the simple mechanics of driving and he is newly hired, he should be disqualified from further employment unless, in the opinion of the supervisor, the failures are quickly and effectively correctible.

"If the employee handles the car well, but is inclined to carelessness, his supervisor should discuss with him his failure to pass the test and should point out that he will be retested within a short time. If he fails upon being re-tested, it would appear desirable, if he is newly hired, to disqualify him. If a veteran employee fails in the riding test, he should have adequate opportunity to correct his bad habits and should be assisted as necessary by his supervisor so that he may do so."

The management group of Southern California Gas Co., Mr. Grant reported, subsequently authorized a driver training program to be drawn up and installed in which the three major phases of testing and training would be as follows:

1. A vision test will be given to all new employees who will drive company cars. This test will be given by the personnel department. It will consist of the Keystone Tele-Binocular test, augmented with a test for lateral vision and for depth perception. Employees whose automobile accident frequency is high will be given tests regardless of their seniority.

2. Road tests will be given to all employees who spend a considerable portion of their time driving. The type of road test, with score sheets, etc., will be prepared by the safety department and be standard throughout the company. In the beginning, road tests will be confined to new employees, but will later be extended to all employees whose driving habits are questionable.

2. A manual of good driving practices will be prepared and will be given to all driving employees. There will be periodic tests given either in company safety meetings or informally by supervisors to make certain that these driving practices are generally known and observed.

In concluding his report, Mr. Grant stated:

"This program, which is both economical and we feel, practical, will be put into effect in the near future. The manual on safe driving will consist largely of a summary of I.C.C. driving regulations and the California Vehicle Code 'Rules of the Road' section. There will be some positive do's and don'ts. We question the wisdom of psychological or psychomotor testing, since the results of army tests indicate that reaction time, hand/eye coordination, stability, balance etc., cannot be effectively corollated with accident experience.

"We question the advisability of awards of any type on the simple theory that a man should not be given a prize for doing the job he is being paid to do. We feel that our program will be productive of good results. If it is not, we will change it to whatever extent it is necessary to make it so."

Boron Master Alloy. A colorful folder issued by Norton Company, Worcester 6, Mass., gives the analysis and features of this special alloy. It is used to increase the depth of hardening, or hardenability of special steels. Most useful in plain carbon or low alloy medium carbon steels. Copy sent on request.

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Report of American Gas Association Committee on Steel Requirements of Gas Utility Companies for Distribution Facilities and Plant Structures and Equipment*

THIS is a report on Steel Requirements of Gas Utility Companies in the United States for Distribution, Plant Structures and Equipment prepared by a committee of the American Gas Association. These steel requirements are the necessary quantities needed by the gas industry to meet the demands of its present customers and new housing extensions. They are the quantities necessary to alleviate present gas shortages and are not the basis of any expansion program of any kind. The quantities shown include also the steel requirements necessary for maintenance, repairs and operating supplies.

These steel requirements are referred to in a similar report of the Petroleum Industry which included natural gas pipe lines from the outlet of producing wells to city gates and it is a continuation of such requirements to transport gas beyond these pipe lines to the homes and factories and commercial establishments of the gas industry's customers and render an essential service to millions of our people.

Authority

The committee acted in pursuance of Paragraph 2 of Section 2 of Public Law No. 395 and by direction of the Association's Executive Board and by verbal understanding with Mr. Max W. Ball, Director of the Oil and Gas Division of the United States Department of the Interior. Its purpose is to place the steel requirements of the gas industry before the proper government authorities so that it might receive its proper weight in any voluntary agreements in the allocation of steel.

Assignment

The assignment to the Association's committee was to prepare an estimate of the steel requirements for distribution and plant equipment and structures of natural gas companies, manufactured gas companies and mixed gas companies in the United States for the period April 1, 1948 to September 30, 1949, for six calendar quarters.

Results

The summarized tabulation of steel requirements is adjoined and is the result of contacting the industry through a questionnaire. Replies were received from 230 gas utility companies representing 77.5 per cent of the total number of customers in 1946. These figures were then projected for 100 per cent of the industry.

It was found that the gas utility companies would require in the period covered in this report a total steel pipe requirement of 166,400 tons of 16" and larger; 285,000 tons of from 6⅝" to 16" in diameter; 113,100 tons of 2" and 5"; and 143,000 tons of 4½" and smaller of welded.

The tabulation shows also a total requirement of 211,400 tons of cast iron pipe and approximately 57,000 tons of plates from 3/16" to 1¼" with 70 per cent of this item in sizes less than ⅝" in thickness.

The categories over which these quantities were spread were: Gas Mains; House Services; Gas Holders; Liquid Storage Tanks; Gas Works Structures; Buildings; and Machinery.

Estimated Steel Requirements For the Period April 1, 1948 to Sept. 30th, 1949

	Tons
Structural Shapes	23,700
Carbon Steel Bars	7,200
Sheets:	
16 gauge and heavier	5,400
17 gauge and lighter	5,400
Plates	
3/16" to ⅝"	39,300
over ⅝"	17,100
Line Pipe	
16" and larger	166,400
6⅝" to 14"	285,300
2" to 5" seamless	113,100
4½" and smaller, welded	143,000
Total Steel	805,900
Cast Iron	211,400
Total Steel and Cast Iron	1,017,300

The gas industry itself had a total of over 21 million customers in 1947 serving over 85 million people. The importance of its steel requirements in the light of its service in the daily lives of so many millions of our people cannot be overstressed.

** Steel requirements for natural gas pipe lines from producing wells to city gates are shown in another report of steel requirements for the petroleum industry issued by a committee of the National Petroleum Council.*

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THIS REPORT ...may mean much to you.
Our Standard Inspection Report tells the actual condition—inside and out—of each gas holder examined. It gives you the hidden facts on where serious corrosion trouble may be brewing in your holders. It points out misalignments — their cause and best corrective measures. In short—it will save you money on your gas holder investment. Let us give you the facts.
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Along the Pipe Lines

Texas Gas Signs Contracts to Bring Large Gas Flow to Appalachian Area

Texas Gas Transmission Corporation announced in June that it has signed 20-year contracts with subsidiary companies of Consolidated Natural Gas Company and Columbia Gas System and with Texas Eastern Transmission Corporation for delivery of 235,000,000 cubic feet of natural gas a day for use in the Appalachian and other Eastern areas by June 1, 1950.

The new contracts are contingent upon construction by Texas Gas of a 26-inch, 800-mile pipeline from the Carthage Gas Field in Texas to a point near Middletown, Ohio, as previously announced.

Under terms of the new contracts, Texas Gas expects to be able to put its new line in preliminary operation by late 1949. Deliveries from this date until the Spring of 1950 are expected to average 265,000,000 cubic feet a day. Of this amount, 165,000,000 will be delivered to Consolidated and Columbia subsidiaries.

After June 1, 1950, Texas Gas will deliver 235,000,000 cubic feet a day to Texas Eastern at the latter's Compressor Station No. 16 near Lebanon, Ohio. Texas Eastern, in turn, will transmit 210,000,000 cubic feet a day of this amount to The East Ohio Gas Company (Consolidated subsidiary) and to The Ohio Fuel Company and The Manufacturers Light and Heat Company (Columbia subsidiaries). Texas Eastern will retain the remaining 25,000,000 cubic feet a day for its system's use.

Under the terms of another contract, now being negotiated, Texas Gas will supply 40,000,000 cubic feet of natural gas a day to Louisville Gas and Electric Company, which served the City of Louisville, Kentucky. This total of 275,000,000 cubic feet a day, together with additional gas to be served to the Company's Memphis and Kentucky systems, will take up the full initial capacity of the new line.

In a companion move to insure supplies at the southern terminal of the Texas Gas new line, Texas Gas has contracted to purchase from Texas Eastern up to 200,000,000 cubic feet of natural gas a day for its new line.

In addition to the 200,000,000 cubic feet a day to be available from Texas Eastern at Lisbon, Louisiana, Texas Gas is now executing contracts for the purchase of an additional 165,000,000 cubic feet of gas per day with various gas producers in the Carthage Gas Field, Texas.

W. T. Stevenson, executive vice president of Texas Gas, declared that the contracts already signed and those in the process of being signed assure Texas Gas the bulk of its gas requirements for the new line. By the winter of 1949-50, Mr. Stevenson declared, the Corporation expects to bring substantial relief to areas that have been hard hit by industrial shutdowns and unemployment, and to help relieve domestic gas shortages during the winter months.

El Paso Natural Gas Asks Authority for Capacity Increase

El Paso Natural Gas Company of El Paso, Texas filed on June 16th an application with the Federal Power Commission for authority to construct and operate additional natural gas transmission facilities which will increase the daily delivery capacity of the company's system by 180,000,000 cubic feet.

Of the additional capacity which is being proposed, 80 million cubic feet per day is intended for delivery to distribution companies in Arizona, New Mexico and west Texas and 100 million cubic feet per day to the Southern California Gas Company and the Southern Counties Gas Company serving southern California.

The additional facilities for which authorization is being requested consist primarily of about 450 miles of 30-inch pipe line running parallel to portions of the company's existing 26-inch line between Lea County, New Mexico and a point on the Colorado River near Blythe, California. In addition, the company is proposing to construct about 33,000 horsepower of new main line compressor capacity and a number of related facilities, including feeder and gathering lines.

In its application, the company stated that the gas which it proposed to transport would be obtained from supplies of flare gas in the Permian Basin of west Texas and Southeast New Mexico. This gas, the company added, is now being vented to the air for lack of a market.

Panhandle Eastern Pipe To Construct New Facilities

The Federal Power Commission made public an order on June 11th, authorizing the Panhandle Eastern Pipe Line Company to construct and operate additional natural gas transmission facilities which will increase the delivery capacity of its system by 102,000,000 cubic feet of gas daily. Cost of the facilities has been estimated at $27,021,000, or $26,615,000 if an alternate plan is used.

Conditions of the FPC order authorizing the project provide that (1) Panhandle shall not use the facilities for service to any new customer without specific FPC authorization and (2) reports shall be made from time to time on increases in the capacity of the line.

Designated in the company's application as "Group C" facilities, the construction project includes the addition of 30,600 horsepower to existing compressor station facilities, construction of about 356 miles of 26-inch line as looping of the main transmission line, and appurtenant facilities. The authorization also allows the company to install one additional 1000 horsepower unit in its Sunray Compressor Station in Moore County if the Guymon station previously authorized is constructed. If the Guymon station is not constructed, the authorization allows the company to install three additional 1000 horsepower units in its Sunray compressor station.

Completion of the Group C facilities in addition to the Groups A and B facilities previously authorized will give Panhandle two interconnected looped lines from its Liberal station in Kansas to Detroit, Michigan with segments of a third loop line, and will increase the daily sales capacity of the system to an average of 575,000,000 cubic feet during the summer months and 610,000,000 cubic feet during the winter months.

The Ohio Fuel Gas Co.

The Ohio Fuel Gas Company has filed an application with the Federal Power Commission seeking a certificate of public convenience and necessity authorizing construction and operation of replacement pipeline facilities to provide increased transmission capacity to Toledo, Fremont and adjoining areas in Ohio. Cost of the facilities has been estimated at $3,082,000.

The changes proposed in transmission facilities are necessary to provide capacity for adequate service to existing markets and to provide for anticipated growth of those markets, Ohio Fuel said. No additional markets are being considered for connection to the line, since the new line will follow the same rights-of-way as the existing line. No existing customers will be deprived of service, the company said.

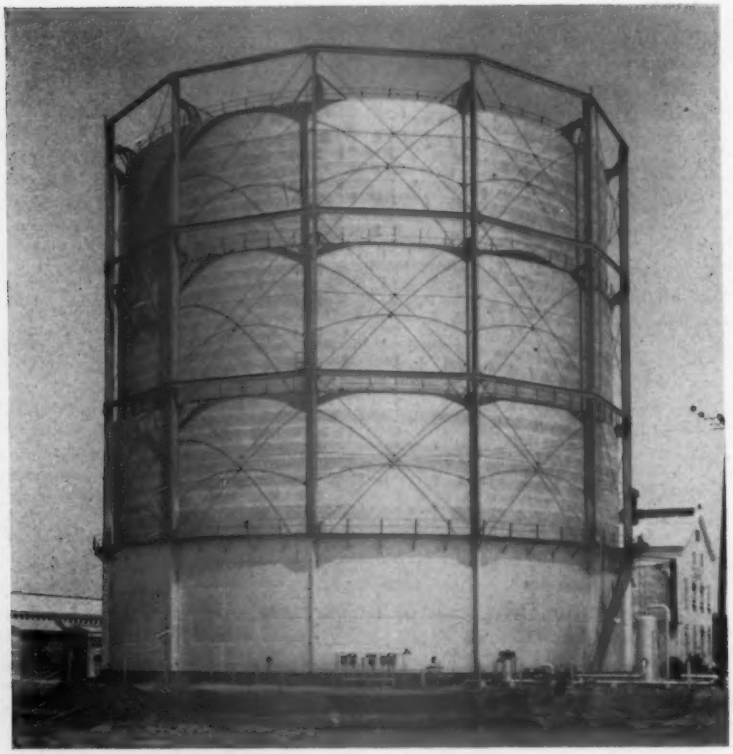
Communities which will be served from the proposed line include, Toledo, Lime City, Maumee, Moline, Perrysburg, Rossford, Stony Ridge, Walbridge, Ottawa Hills, Sylvania, Luckey, Pemberville, Elmore, Genoa, Woodville, Gibsonburg, Helena, Fremont, Port Clinton, Oak Harbor, Green Springs, Bloomville, Republic, Attica, New Washington, Shiloh, Greenwich, New London and Pavonia. In addition, four main line industrial customers and two wholesale customers would be supplied through the new line.

Alabama-Tennessee Natural Gas Co.

A Federal Power Commission presiding examiner has filed a decision granting, subject to Commission review, a certificate of public convenience and necessity to Alabama-Tennessee Natural Gas Company to construct and operate natural gas transmission facilities to serve markets in northern Alabama and northern Mississippi.

This line is designed to have a capacity of 30,179,000 cubic feet of gas daily at the point of delivery from Tennessee Gas Transmission Company's main line. It would be able to deliver 17,600,000 cubic feet a day at Florence, Sheffield and Tuscumbia, 4,300,000 cubic feet at Decatur, Alabama, 4,400,000 cubic feet at Huntsville, Alabama, and would provide for intermediate service to other towns and cities along the way. Cost has been estimated at $2,900,000.

Elastic Coating for Gas Holder Uses Spray Application



Gas holder after recoating with special protective compound.

HOW TO PROTECT metal surfaces effectively against weathering—and do this at economical cost with minimum manpower—poses an unusual maintenance problem, at one time or another, to all users of storage vessels or other equipment which is continually subject to the ravages of outdoor exposure.

In the public utilities industry, gas holders afford one prime example of a structure where provision for long-term protection against the deteriorating influences of atmosphere and climate calls for superior equipment performance and long-service life. With these units, alternate submersion of lifts and exposure to the elements tends to make such surfaces highly susceptible to every corrosive atmospheric and climatic condition.

Since 1942, engineers of The Pacific Gas and Electric Company have been conducting tests on metal surface protection problems in their search for durable coatings that would cut down the frequency of repainting gas holders. Last year saw the completion of a series of exhaustive tests, looking toward a solution of this problem.

These tests provided for the immersion of coated panels (½ exposed ½ immersed) in tanks, one containing water from San Francisco Bay and one containing fresh water, for a period of over five years. Sprayed with a coating of a specially developed weather-resistant, water-repellent material, these panels were removed and inspected after this prolonged, severe exposure. P. G. & E. engineers found there was no break whatever in the protective film, and hence, no corrosion of metal in any respect.

As a practical field check on these test results, the company reconditioned two gas holders of 1,023,000 and 75,000 cubic feet capacity respectively in Fresno. Here in brief is the operational method of application:

Paraffin grease, the protective material formerly used, was first removed from the surface of the gas holder by scraping and wire-brushing, supplemented by solvent-cleaning. The entire surface preparation process was completed in 25 eight-hour days by a 20-man crew.

Spray application of the new material to the holder was handled in 10 eight-hour days by a three-man crew. Coverage rate was 27 square feet of surface area per gallon of material, which was delivered directly from original drums by Alemite and Lincoln pumping equipment and applied with a Binks 7E-1 spray gun at 100 lbs. air pressure at the nozzle. The entire job was handled by General Waterproofing Company, San Francisco.

The new weatherproofing material is a technical development of the Arco Research Laboratories, Cleveland and Los Angeles, which pioneered the development of a comparable self-healing coating for masonry and concrete structures, and is designed to simplify long-term maintenance of all types of exposed steel structures. It forms a tough but elastic and pliable protective-decorative coating many times the thickness of paint to seal out measurable vapor, moisture, chemical gases and fumes, and thus prevent surface corrosion and deterioration from these sources. Of further interest in this connection is the unusual fact that if the outer skin of the protective film becomes bruised or broken, its exposed sub-surface hardens and "heals" itself.

The engineers of Pacific Gas and Electric have been watching these field applications for over a year, and are finding that they show the same good weathering qualities which had been indicated by the preliminary test samples.

The exposure history of these installations during the next few years will continue to be of considerable interest to all gas utility maintenance forces.

Underground Corrosion Exhibit

In connection with comparative field tests of the corrosion resistance of various pipe materials in different types of soils, the National Bureau of Standards has announced an exhibit of approximately 3000 actual test specimens. Chemists, metallurgists, corrosion engineers, and others interested in the behavior of materials underground are invited to inspect the test samples, which will be on display until August 15, 1948, in the Bureau's Underground Corrosion Laboratory, Connecticut Avenue and Van Ness Street, N.W., Washington, D. C.

The specimens were exposed at 15 test sites throughout the United States for periods ranging from five to fourteen years. They consist of 85 varieties of materials, including seven types of wrought iron and wrought alloys, 17 types of cast iron and cast alloys, 22 types of steel and steel alloys, 13 types of copper and copper alloys, and miscellaneous samples of lead, zinc, metallic- and nonmetallic-coated pipe, and asbestos-cement pipe. Measurements of loss of weight and depth of pitting of the specimens have been made, and a report on the corrosion resistance shown by the materials studied is in preparation.

New Equipment and Appliances

Kinmont Power Unit

The Kinmont Universal Power Unit operates on the chain tong principle, and weighs only 71 pounds. A foot switch accessory is available to permit remote control. The drive chain is provided with patented quick action connecting links for rapid lengthening of the chain to accommodate work of larger diameter.

It is especially adaptable as a positioner for welding, cutting, fitting, grinding, threading, painting, sandblasting and other similar operations.

Portable Power Unit

For handling large tanks or similar objects, adjustable roller fixtures can be utilized. The full weight of the work is not imposed upon the power unit and objects weighing as much as 20,000 pounds can be handled.

With pipe set on rollers, it will turn several hundred feet of pipe while a group of welders operate the entire length.

Operates on either AC or DC power and can be plugged into any portable gas driven arc welder in the field. A reversing switch permits rotation of working material in either direction.

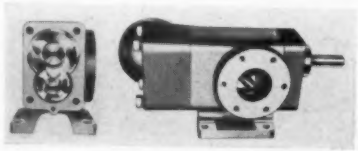
Overall length is 40½ inches, width, 10⅛" and height 15⅜". Is compact enough to be operated in limited space. Further details, from Kinmont Manufacturing Co., Inc., 718 West Wilson Avenue, Glendale 3, California.

Helical Rotor Pumps

The Syntron Company, 920 Lexington, Homer City, Pa. have just announced a line of positive displacement, extremely simple, helical rotor pumps.

Two helical rotors, one a driving rotor and the other an idler rotor, force the liquid ahead in an axial flow in volume and at pressure.

The shaft of the driving rotor is mechanically sealed by a Syntron "Anti-Friction" shaft seal against leakage.



Syntron Oil Pump

Built in two sizes these pumps are primarily designed for handling various grades of oils at either 50 or 75 gallons per minute, at pressures of up to 125 psi in a smooth, pulseless flow.

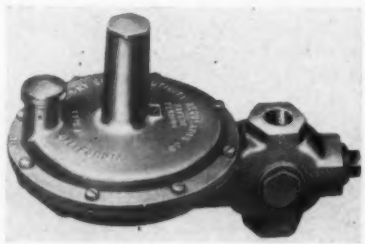
Catalog information is available from the manufacturer.

Pounds-To-Inches Gas Pressure Regulator

Remarkable regulation characteristics over a wide range of inlet pressures is an outstanding feature of the new Utility Type A Domestic or Service Regulator.

Designed primarily for major utility companies' use as a house regulator, the unit serves in many other applications where close gas pressure regulation is essential.

Inlet pressures may vary from 3 to 50 or 75 pounds, yet the final outlet pressure, reduced to inches of water column is stated to remain almost constant throughout the entire range.



Reducing Regulator

Other features are the rain proof atmospheric vent, stainless steel spring, highly resilient synthetic rubber diaphragm, and high grade aluminum alloy castings machined to precision standards and coated to prevent corrosion. In performance and appearance, the regulator is for general utility company use. A new bulletin No. U-105 is available from Utility Regulator Co., 800 East 108th Street, Los Angeles 2.

Suspended Unit Heater

This new suspended fan type heater is a completely mounted—one package unit. All controls and motor are rigidly mounted, wired and tested at the factory. Merely connect the hangers to the ceiling support, and complete the gas and electrical connections.

The gas inlet is so arranged to enable the user to remove the unit if ever necessary, without interruption of service to other gas equipment.

Peerless Unit Heater

The burner pan unit is "hinged"—swings down for free access in cleaning any dust collected.

These units range in input from 65,000 B.T.U. to 200,000 B.T.U. Manufactured by Peerless Manufacturing Corporation, Louisville, Kentucky.

Payne Heating Units

Two new forced air gas furnaces have been introduced by Payne Furnace Co., Beverly Hills, Calif.

The "Sentry" is designed for non-basement installations and can be placed in a closet, on the service porch, in the kitchen, or any available corner. Cold air is drawn in the bottom or side and ducts carry heated air out the door.

The "Zoneair," in a shorter and deeper casing, is designed to facilitate basement installations. It is available in the same four sizes (67,000 to 167,000 b.t.u. input per hour) as is the "Sentry." Cold air is drawn in and warm air discharged through ducts in the furnace top. Bulletins on request.

News of the Gas Industry

Third Annual Short Course in Gas Technology Held at Kingsville, Texas

A total of thirty-seven speakers and instructors from seven states addressed a record attendance at the Third Annual Short Course in Gas Technology on June 2-4. Attendance was estimated at better than two hundred fifty.

The course was divided into two study groups, both running through the three day period. W. W. McGee, Jr., of the Tennessee Gas Transmission Co., Houston; D. T. McRoberts, United Gas Line Co., Shreveport, La., and Robert M. Hutchison, Houston Natural Gas Corporation, Houston, were in charge of the section on latest methods for solving problems of production and transmission, with 13 lecturers appearing on their programs, and a like number were heard by those attending the section dealing with improved techniques in the utilization of Natural Gas. This section was chairmaned by C. A. McKinney of the United Gas Corporation, Houston, with Chester Young, Lone Star Gas Co., Dallas, and George Elmer May, New Orleans Public Service, on the committee.

The Administrative committee was headed by Dr. Frank Dotterweich, head of the department of engineering at A&I, whose national reputation as an authority on natural gas engineering has drawn key figures in the industry throughout the South to the campus for these short courses during the three years he has conducted them.

Production and Transmission

The section on Production and Transmission offered solutions to many of the problems encountered in these phases of operation. Corrosion and its prevention; latest developments in the construction and operation of pipe lines including long-distance ones; applications and testing of pipe coatings all were discussed thoroughly by leading authorities in each field. The great strides in design and use of centrifugal compressors was described and their present use at the Seeligson Plant explained.

The physical properties of natural gas which offer trouble in its measurement as well as the physical properties which are the chief cause of problems in production of gas-condensate wells were discussed in great detail. The final lecture in this section on "Cycling" of natural gas was received with great interest.

Utilization

In the section on Utilization of Natural Gas it was shown that use of this perfect fuel would go far in stabilizing the economy of a given region. A kiln to efficiently and effectively dry lumber was introduced. Uses of natural gas in such operations should become of increasing importance to the Southwest. In chemurgic processes where the science of chemistry is applied to agriculture, the use of natural gas as a fuel was predicted to bring unlimited expansion in this field. Accompanying such an expansion would be an increase in all forms of agricultural productivity which should have a tremendous effect upon the Southwest and especially Texas.

Stress was placed upon the many developments whereby the use of natural gas for heating and cooling of residences had become superior to its competitors. Methods whereby natural gas can be effectively used to control conditions of humidity and can be a source of efficient and cheap power rounded out the section on Utilization.

Administration

The membership of the Administrative and Advisory Committee for the annual affair reads like Who's Who in the gas industry, with Dean A. Strickland, general manager of the United Gas Corporation, Chester L. May, vice president of the Lone Star Gas Company, and Frank C. Smith, president of the Houston Natural Gas Corporation listed as members. Dr. Frank H. Dotterweich, director of the engineering division of A&I, is administrative chairman for the course. "Men with practical, rather than only theoretical experience, were chosen for the faculty," said Dr. Dotterweich.

At the first general assembly, W. H. Ligon, president of the Southern Gas Association, outlined the aims of the short course, and Dean A. Strickland spoke on "The South's Greatest Asset—Natural Gas."

On Friday evening, 200 attended a dinner at Loftin Hall where Chester L. May, vice president of the Lone Star Gas Company, Dallas, delivered the principal address, "Look to America." He was introduced by Frank C. Smith.

The inspection trip to the famed King Ranch was enthusiastically received by the registrants; and the trip made possible not only an inspection of cattle and race horses, but also a view of the drilling campaign presently being conducted.

The final day saw the registrants following up class room instruction with field trips to inspect cycling, gasoline, dehydration, and chemical plants in Corpus Christi and vicinity.

Gaissert Joins Ebasco Services as Gas Rate Consultant

L. J. Gaissert, associated with the Atlanta Gas Light Company from 1936 in the capacity of Industrial Sales Engineer and Head of its Dispatching and Statistical Department, has joined the Rate Department of Ebasco Services Incorporated as a Gas Rate Consultant. Mr. Gaissert, a civil engineer, was on leave of absence from the Atlanta Gas Light Company from 1942 to 1946, when he served with the Combat Engineers of the Army of the United States in World War II.

CONVENTION CALENDAR

July

12–13 *Michigan Gas Association,* Joint Meeting with Mich. Elec. Lt. Assn., Grand Hotel, Mackinac Island, Mich.

September

10 *New Jersey Gas Association* 33rd Annual Meeting, Hotel Monmouth, Spring Lake, N. J.

13–14 *Midwest Gas Association.* Gas School and Conference, Iowa State College, Ames, Iowa, Hotel Sheldon-Munn.

14–16 *Pacific Coast Gas Assn.,* Annual Convention, Sant Cruz, Calif. Hotel Casa del Rey.

17 *Oklahoma Utilities Association,* Gas Division, Biltmore Hotel, Oklahoma City.

20–22 *National Butane-Propane Assn.* Annual Convention and Trade Exhibit, Congress Hotel, Chicago.

October

4–8 *American Gas Assn.* Annual Convention and GAMA Exhibit, Atlantic City, N. J.

14–15 *Texas Mid-Continent Oil and Gas Assn.,* Annual Meeting, Fort Worth.

21 *New England Gas Assn. Operating* Division. Hotel Sheraton, Worcester, Mass.

25–29 *National Metal Exposition and Congress,* Philadelphia, Pa.

November

1–3 *Wisconsin Utilities Association,* Pfister Hotel, Milwaukee.

8–11 *American Petroleum Institute,* Stevens Hotel, Chicago.

8–12 *National Hotel Exposition,* Grand Central Palace, New York.

18–19 *National Personnel Conference* of the Gas Industry, Palmer House, Chicago.

Meeting of national and regional gas association groups in New York, June 16. Left foreground, left to right: H. L. Massey, ass't managing director, Gas Appliance Manufacturers Association; H. O. Andrew, editor, "Gas Age"; J. M. Beall, editor "A.G.A. Monthly": Around the table, left to right: Edwin L. Hall, director, American Gas Association Laboratories; Ed. Titus, eastern editor, "Gas"; George H. Smith, ass't managing director, A.G.A.; H. Leigh Whitelaw, managing director, G.A.M.A.; Robert B. Suttle, managing director, Southern Gas Association; Clark Belden, executive-secretary, New England Gas Association; Clifford Johnstone, managing director, Pacific Coast Gas Association; K. R. Boyes, secretary, A.G.A.; and S. G. Krake, publisher, "American Gas Journal."

Gas Associations Coordinate Programs and Activities

The programs of the national and regional gas associations were thoroughly reviewed at an all-day meeting June 16 at American Gas Association headquarters in New York. Purpose of the meeting was to promote more effective cooperation, coordination and integration of activities and the prevention of overlapping of programs.

Attending the meeting were staff members of the A.G.A., Gas Appliance Manufacturers Association, and managing directors of the New England Gas Association, Pacific Coast Gas Association and Southern Gas Association. During part of the session, editors of gas trade magazines participated and exchanged views on news coverage and other pertinent topics.

Various national A.G.A. programs, particularly those devoted to research, promotion and advertising, now under way or in the planning stage were described and many points of coordinated activity were discussed. The A.G.A. Laboratories' appliance testing program came in for review as well as statistical, utilization, commercial, industrial, residential and other activities. A point of special interest to the manufacturers' association was the exchange of views on the question of whether it is desirable to hold gas appliance exhibitions in connection with regional association conventions.

A special feature of the meeting was the showing of the splendid color motion picture "The Eternal Flame," produced by the Columbia Gas System, Inc.

Natural Gas and Petroleum Assn. Annual Convention

The Natural Gas and Petroleum Association of Canada held its 22nd annual convention at the General Brock Hotel, Niagara Falls, on May 27 and 28.

President S. A. Morse, of Chatham, presided at the business session Thursday evening, at which committees were named to look after the business of the convention.

Greetings from the American Gas Association were brought by George H. Smith, director of the natural gas department.

In the absence of K. Stookey, president of the Gas Machinery Co. of Cleveland, Ohio, C. M. Sieger of the United Gas and Fuel Co., Hamilton, gave an extemporaneous address on recent developments in the operation of oil-gas supplementary plants. Mr. Sieger urged the advantages of this type of gas production, and also dealt in a practical way with the problems arising from the mixing of natural gas with artificial products of various types.

The Friday afternoon session was featured by the questionnaire on problems of the gas industry, Vice-President S. B. Severson presiding.

The following officers were elected for the coming year:

Honorary president, Major E. Sweet, Brantford; past president, S. A. Morse, Chatham; president, C. N. Glenny, Provincial Natural Gas Co., Fort Erie N.; first vice-president, S. B. Severson, Dominion Natural Gas Co., Buffalo; second vice-president, J. B. McNary, Hamilton; treasurer, George H. Smith, Port Colborne; secretary, Jos. McKee, United Gas and Fuel Co., Hamilton. Directors, Frank D. Howell, Brantford; J. B. McNary, Hamilton; J. A. McNevin, K.C., Chatham; Thos. Weir, Union Gas Co., Chatham, and Gordon D. Wickett, Windsor.

In the report of the directors, presented earlier in the day by President S. A. Morse, announcement was made that the 1949 convention would be held on May 26 and 27, 1949 at the Hotel London, London, Ont.

Southwest to Participate in National Personnel Conference

Members of the A.G.A. Southwest Personnel Conference at a meeting held in Birmingham, Alabama on June 7, voted to cooperate with the A.G.A. Midwest Personnel Conference and the A.G.A. Personnel Committee in sponsoring a Gas Industry National Personnel Conference next November in a city to be selected later.

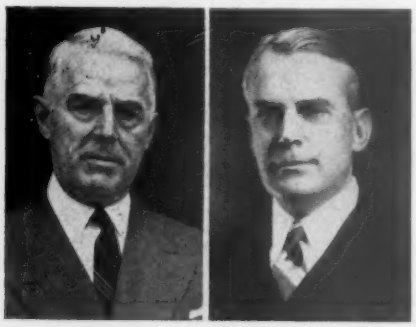
About twenty-five personnel executives attended the meeting under the chairmanship of Willard Wiegel, Personnel Director of the Lone Star Gas Company, Dallas, Tex. Reports were made on trends and developments in union contract negotiations, cost-of-living bonuses, pension plans, leaves of absence for military training, employment of minors, college graduate placements, wage rate exchange and other pertinent problems. In the interest of coordination, the industrial relations activities of the American Gas Association were described by its Secretary, Kurwin R. Boyes.

Arrangements for the conference were made by Robert G. Kenan, Southern Natural Gas Company. The next meeting of the Conference will be held in New Orleans, September 10. Representatives of gas companies are cordially invited to attend this and future meetings. R. P. Marshall, Texas Gas Transmission Corporation, Memphis, Tenn., will be pleased to answer request for copies of the notice for the meeting.

Executive Changes Announced by U. S. Pipe & Foundry Co.

The United States Pipe and Foundry Co., Burlington, N. J., has announced the following changes in executive staff:

At his own request, President N. F. S. Russell was relieved of the active direction of the affairs of the company and elected chairman of the board at a meeting of the board of directors held on April 22. At this same meeting General Donald Armstrong, executive vice-president, was elected president and chief executive officer.



N. F. S. Russell Donald Armstrong

Mr. Russell started with the company at the Scottdale, Pennsylvania, plant in 1910. Serving successively as salesman, eastern sales manager, purchasing agent, and general sales manager, he was elected vice-president in 1921, and president in 1923. He served as president for twenty-five years during which time the company prospered. These were the years that marked the development of the method of casting cast iron pressure pipe centrifugally in metal molds. This method has nearly displaced the pit-cast method for sizes up to twenty-four inch. At first there was deLavaud pipe and ten years later the improved Super-deLavaud pipe.

General Armstrong has had a broad experience extending over thirty-seven years in all aspects of the Army Ordnance Department, which includes an intimate knowledge of many industries that furnished billions of dollars worth of ordnance materiel. During World War II he was Chief of the large Chicago Ordnance District. Later General Armstrong was made Commandant, Industrial College of the Armed Forces. In 1945 he was awarded two Legions of Merit by the War and Navy Departments for service in World War II. He was also awarded the Distinguished Service Medal by the Army for service in World War II.

Under the direction of General Armstrong, who is so eminently qualified to guide its destiny, the company should continue to progress.

Josef H. Buerger, Jr., has been appointed Sales Manager of the Special Products Division. This division manufactures and sells tubular products of gray iron, alloy iron, carbon steel, alloy steel and stainless steel cast centrifugally in metal molds.

Explosive Hazards in Underground Structures

An 18-page report on explosive hazards of underground structures has been prepared under directions of the Sub-Structure Committee of the City of Los Angeles and pertains particularly to local conditions, including control procedures now in effect.

The origin of explosive products, sources of ignition and protective measures employed are given in some detail. An appendix lists examples of explosions which have occurred locally during the last decade and the causes where known.

Chairman of the Sub-Committee which prepared the report is W. M. Henderson, Superintendent of Distribution, Southern California Gas Company, Los Angeles.

The report should be of considerable interest to gas distribution engineers in all cities.

The Gas Machinery Company Appoints Cornish and Kyle

Ross C. Cornish, general consulting engineer, has joined The Gas Machinery Company, Cleveland, Ohio, as consulting engineer. Mr. Cornish has been connected with the gas business for over fifty years. For 16 years, he was Chief Engineer of The American Gas Company in charge of engineering and operation of gas and electric plants. After the purchase of The American Gas Company by The United Gas Improvement Company, he was Assistant to the Vice President in charge of engineering development. Mr. Cornish later was Chief Engineer of Semet-Solvay Engineering Corporation.

Ross C. Cornish Robert Kyle

Robert Kyle recently joined The Gas Machinery Company as Gas Sales Engineer. A graduate Gas Engineer of Johns Hopkins University, he received early training at the Consolidated Gas, Electric Light & Power Company of Baltimore and at the American Gas Association Laboratories in Cleveland.

Mr. Kyle was formerly with the General Controls Company as Branch Manager of the Cleveland office; prior to that with the Iroquois Gas Corporation, Buffalo, New York, as Gas Engineer where he engineered the first High B.t.u. installation (twin generator process) installed by The Gas Machinery Company.

In his new capacity, Mr. Kyle expects to serve the many gas companies and other industrial plants for which The Gas Machinery Company is designer, fabricator, or erector.

Thorp Leaves Laboratories Staff To Establish Own Firm

Chester A. Thorp, Chief Research Engineer of the American Gas Association Testing Laboratories, has resigned in order to establish his own business.

Mr. Thorp, who has headed Laboratories research operations for the past three years, is establishing his firm in Los Angeles where he worked for many years and is widely known. Under his direction research activities at the Laboratories were extensively reorganized and the staff strengthened by the addition of a number of carefully selected engineers and scientists. The Laboratories' recent research accomplishments have been due in large measure to Mr. Thorp's administrative ability.

Well known as a utilization engineer, Mr. Thorp formerly headed the Gas Appliance Laboratory jointly maintained by Southern California Gas Company and Southern Counties Gas Company of California. During the war he served as a Lt. Commander in the navy. He has been associated with the gas industry for more than twenty years.

Dearborn Stove of Dallas Elects Norris V.P. and G.M.

Robert H. Norris, treasurer of the Dearborn Stove Company, Dallas, Texas, was elected vice president and general manager of the company at a recent meeting of the board of directors, according to an announcement made by Roy M. Liedstrand, Dearborn president. Mr. Norris, in addition to his new duties, will continue to function as treasurer.

Mr. Norris has been with Dearborn for three years, entering the company in the capacity of controller at the time that Dearborn acquired their present Dallas factory facilities and moved a major portion of its operations from their Chicago plant. He was elected treasurer of the company in January, 1947.

Prior to his association with Dearborn, Mr. Norris was active in ordnance plant operations during the recent war period.

The Dearborn Stove Company is a manufacturer of vented, unvented and open radiant type space heaters and also a popular priced evaporative cooler.

Dravo Corp. of Pittsburgh Appoints So. Calif. Distributor

Harry F. Haldeman, Inc., 1106 South Hope Street, Los Angeles, has been appointed distributor in Southern California for Dravo "Counterflo" Heaters, manufactured by Dravo Corporation, Pittsburgh, Pennsylvania.

The Haldeman Company was incorporated in California 15 years ago and specializes in heating, ventilating and air-conditioning equipment. Representing a number of well known manufacturers, Harry F. Haldeman, Inc., has supplied a high percentage of the large, forced-air heater installations in Southern California for the past seven years.

Dravo "Counterflo" Heaters are direct-fired, forced-air heaters for industrial and commercial buildings.

Rochester Gas & Elec. Co. Files for Increase in Rate

Declaring that cost of producing and distributing gas has risen so high that gas earnings have disappeared, the Rochester Gas and Electric Corporation, Rochester, N. Y., has filed with the New York State Public Service Commission a new schedule of gas rates that will increase cost to the consumers about 13 per cent on the average.

The increases will affect all classes of customers . . . industrial, commercial and residential. The average residential customer in the Rochester area using gas for cooking and water heating will be increased about 37 cents per month, whereas the average customer using gas for househeating, as well as for cooking and water heating, will be increased about $2.93 per month. The present initial charge of 500 cubic feet for 75 cents per month will be increased to 85 cents for 400 cubic feet per month. The increases, if allowed by the Public Service Commission, will add about one million dollars annually to the R. G. & E. revenues and will be spread over 127,000 gas customers.

Ruud Appoints J. R. Lavelle Mgr. Direct Factory Branch

Ruud Manufacturing Co., Pittsburgh, Pa. has appointed John R. Lavelle as manager of direct factory branch at 34 Exchange Place, Jersey City, N. J., serving the metropolitan area. He heads a fully manned institution for service to Ruud customers and has had wide experience in the water heater business.

Roberts-Gordon To Build Dual Fuel Conversion Burner

L. C. Smyth, Vice President of the Roberts-Gordon Appliance Corporation, Buffalo, N. Y., has announced that his company will soon be in production on the Gordon Dual Fuel Conversion Burner under license by the Midwest Research Institute.

Forced warm air furnaces and boilers will be offered as complete units.

The new development, according to Mr. Smyth, is the ideal answer to heating fuel shortages that have plagued utilities and consumers over recent years.

At a predetermined peak load temperature reading regulated by an outdoor control, the unit automatically switches from gas to oil. When the temperature again goes above the mark the unit reverts to gas. A 275 gallon oil tank is supplied with the Gordon Fuel Conversion unit.

New A.G.A. Personnel Group

A Great Lakes Personnel Conference sponsored by the Personnel Committee of the American Gas Association was organized at a meeting of gas company personnel executives held June 11 in Chicago. Purpose of the conference, which will be patterned after the A.G.A. Southwest and Midwest Personnel Conferences, is to provide an opportunity for discussion of developments and trends in the gas utiilty industrial relations field.

L. A. Brandt, Assistant to Vice-President, The Peoples Gas Light and Coke Co., Chicago, has been elected first Chairman of the Great Lakes Personnel Conference. The next meeting will be held in Chicago, September 14, and all utility personnel executives in that area are invited to participate. Details of the program will be supplied upon request to Mr. Brandt.

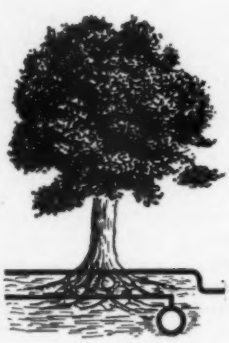
At the June 11 organization meeting, Vernon Myers, Sioux City Gas and Electric Co., Chairman of the Midwest Conference, explained how effectively these informal groups function. Kurwin R. Boyes, Secretary, American Gas Association, outlined the cooperative efforts of the Association designed to assure maximum usefulness of these meetings to gas company members.

C. G. Simpson, The Philadelphia Gas Works Co., is Chairman of the A.G.A. Personnel Committee.

Purcell Division Manager Philadelphia Electric Co.

J. A. Purcell has been appointed division manager of the newly-created Western Division of the Philadelphia Electric Company, it was announced recently. His headquarters will be at Coatesville, Pa.

Mr. Purcell has been employed by the Philadelphia Electric Company since 1930. He held various positions in both the electric and gas departments of the Company prior to his appointment as division superintendent at Coatesville in 1943, the position he held at the time of his recent appointment.



Vegetation Surveys

NOW is the Season to arrange for inspection of distribution lines to detect leakages.

Our fully trained personnel is at your service. We can submit a complete report covering locations, source of leaks, severity of the condition and vegetation affected. We can cover any section of your lines or the complete system working on a per diem basis.

Write us regarding rates and schedules.

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The mark of
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GAS HEAT for EVERY HOME

Bring comfort, economy, heating efficiency to the homes served by your utility with Roberts-Gordon Conversion Gas Burners, up-to-the-minute answers to home heating problems. Exclusive Spreader Flame principle provides wider range through greater adaptability . . . one size burner provides replacement for boilers and furnaces with input requirements from 50,000 to 200,000 BTU's. Cover the conversion field with a minimum inventory of burner models.

ROBERTS-GORDON APPLIANCE CORP.
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Meininger in Charge of Aluminum Development and Sales for Stacey Brothers

The appointment of Carl W. Meininger to the Sales Staff of Stacey Brothers Gas Construction Company has been announced by W. E. Gruening, President.

Mr. Meininger will be in charge of Aluminum Development and Sales with headquarters in the company's main plant in Cincinnati, Ohio.

Carl W. Meininger

Immediately following graduation from Case Institute of Technology in 1930, Mr. Meininger joined Aluminum Company of America where he served as plant metallurgist, moving up through the ranks to Sales Engineer in charge of heating, air conditioning and refrigeration.

He is well versed in the many new uses found for aluminum, having specialized in the design and development of special brazing processes for all types of aluminum vessels and heat exchangers, which products are now being manufactured by Stacey Brothers.

Gas Consumers Service Names O'Reilly District Supervisor

L. R. O'Reilly has just been named District Supervisor of Gas Consumers Service with headquarters in the Chicago office.

Mr. O'Reilly brings to his new position a wealth of gas experience earned with Gas Consumers which has literally taken him from coast to coast. A member of the American Gas Association and the LP Gas Association, he has been a member of the industry since 1937.

Crosley Div. Avco Mfg. Co. Appoints Redden To Sales

Appointment of Ellis L. Redden as Director of Advertising and Sales Promotion is announced by N. C. Macdonald, General Sales Manager, Crosley Division, Avco Manufacturing Corporation, Cincinnati, Ohio.

He will be responsible for all advertising media, sales promotional activities, training programs, and the Home Economics Department.

Norton Company Announces Appointments to Sales Staff

Harlan T. Pierpont, Jr., has been appointed Sales Manager, Refractories Division of Norton Company, Worcester, Mass.

The appointment was made in conjunction with the announced retirement of Robert Kirkpatrick, Refractories Division Sales Manager.

Mr. Pierpont assumed his new duties July 1. He was formerly Abrasive Engineer for Norton Company in Michigan.

Mr. Kirkpatrick leaves after 29 years' service with the company. His present plans are to spend several months at his summer home in Nova Scotia, returning to Worcester in the fall.

Norman V. Crabtree has been assigned to take over the territory recently covered by Mr. Pierpont. Richard H. Merchant, formerly Field Engineer in Detroit, is appointed Abrasive Engineer and assumes responsibility for Mr. Crabtree's area.

Murner E. Thor, Refractories Division, has been appointed Refractories Engineer effective July 1. He will cover the Canadian and New England territories formerly handled by E. A. Fischer. Mr. Thor's headquarters will be in Worcester. Mr. Fischer transfers to the Refractories Sales Engineering Department as Sales Engineer.

Peoples Natural Gas Co. Reports On House Heating Outlook

After approving 7,500 applications for new space heating installations for the coming winter season The Peoples Natural Gas Company has found it necessary to decline to approve any more applications until further notice, according to Charles L. Yost, sales manager. The rstriction became effective at the close of business May 28.

The company will continue to receive applications and will file them for future approval in the order they are received, according to Mr. Yost.

"We are making every effort to obtain additional supplies of gas to provide for the winter needs of our customers but shortages of pipe and equipment continue to delay the $19,900,000 expansion program which would relieve the present wintertime scarcity of fuel.

"Some improvement in our available supplies of natural gas made it possible for us to grant the 7,500 additional applications this spring. But we do not feel that we can grant any more at this time. This decision was made in order to protect our customers next winter.

"We are unable to say just when the present restrictions can again be lifted. It will be done just as soon as our supplies of gas have increased to the point where the granting of additional heating applications will not work a hardship upon our customers in their present uses of gas fuel," says Mr. Yost.

Domestic Gas Range Sales

During the first quarter of 1948, shipments of domestic gas ranges were 22.8% greater than during the same period of 1947, according to reports received from companies representing approximately 70% of the industry. Unit shipments during the month of March were 26.1% above March of 1947. These companies reported that 26% of their total unit shipments during the first quarter of 1948 were for use with LP gas. LP shipments were 34.5% greater than during the first three months of last year.

Reporting companies indicated that Unfilled Orders totaled 344,940 units on March 31, 1948.

During the year ending March 31, 1948, reporting companies shipped 1,747,937 domestic gas ranges.

Empire Stove Company Appoints Ray Mills at Memphis

Empire Stove Company, Belleville, Illinois, has established a Regional Office at 701 Exchange Building, Memphis, Tennessee, for prompt service to the territory including Eastern Tennessee, Northern Mississippi, Northern Louisiana, and Arkansas.

Ray Mills

L. A. Brand, Vice-President of Empire Stove Company, indicated that other Regional Offices would be established when he announced the appointment of Ray Mills as Memphis Regional Manager. Mills has spent many years in the gas industry and is well known in the gas appliance field.

Hammel-Dahl Co. Appoints West Coast Representative

The Hammel-Dahl Company of Providence, R. I., manufacturers of Automatic Control Equipment, announces the appointment of The Republic Supply Company of Los Angeles as their West Coast Representative.

The Republic Supply Company of California is an independently owned and operated company with Main Offices in Los Angeles and Emeryville and with 16 branch stores throughout the State.

Republic sales activities rest with John J. Pike, president, as well as William T. Mayer and Andrew Formilyant, sales engineers, both of whom have had wide experience with installation of Hammel-Dahl products.

E. M. Borger Elected Director Dravo Corporation

Edward M. Borger, president of The Peoples Natural Gas Company, was elected a director of Dravo Corporation at a meeting of its Board of Directors on June 16th.

Edward M. Borger

Mr. Borger has been president of The Peoples Natural Gas Company since 1940 and is a director of that company and the Consolidated Natural Gas Company.

He started with Peoples as a stenographer and secretary, attended night law school at Duquesne University and was admitted to practice before the Pennsylvania Bar 1922. He was attorney for Peoples and the Hope Natural Gas Company until 1935 when he became chief counsel for those two companies and New York State Natural Gas Company and River Gas Company.

In 1942, Mr. Borger took a leave of absence from his post with the gas company to enlist in the American Field Service for duty in the Middle-East during the war.

Koppers Appoints Fred C. Foy V.P. and Sales Mgr.

Fred C. Foy, Vice President of J. Walter Thompson Company, has accepted an appointment as Vice President and manager of the Sales Department, Central Staff, of Koppers Company, Inc.

As general manager of the Detroit office of the Thompson organization, Mr. Foy also has been supervisor of all phases of the Ford Motor Company advertising, which is handled by that agency. He will leave the Thompson Company on July 1, and will assume his new duties at Pittsburgh headquarters of Koppers August 1.

The appointment of Mr. Foy fills a vacancy created last April 1, when E. J. McGehee, Vice President and sales manager of Koppers, was assigned responsibility for the company's wood preserving activities in the western half of the United States.

Ralph Winslow, Koppers' Director of Public Relations, who has been serving as acting manager of the sales department, will continue to guide activities of both departments until Mr. Foy takes up his new duties here.

Home Gas Co.

In order to bring an increased supply of gas to many Southern Tier Communities, in New York State, Home Gas Co. is investing about $800,000 to lay nearly 30 miles of new high pressure natural gas pipe line between Hancock and Cochecton, N. Y.

The new underground highway for natural gas will have its origin on the Home Gas Co. pipe line system about a mile north of Hancock. In crossing the Delaware river near this town, twin 10¾ in. steel pipe lines will be laid in the river bed.

According to gas company officials, the new pipe line will eliminate a bottleneck in the Hancock-Cochecton area. The $800,000 investment is being made at this time since large quantities of natural gas must be moved in a generally westward direction from Port Jervis towards the Binghamton area, and to the company's Dundee underground storage reservoir.

This gas will come into Port Jervis from the recently completed high pressure 14 in. pipe line through eastern Pennsylvania.

Range Sales Increase for Brooklyn Union Gas Co.

Brooklyn Union Gas Company states that range sales in May amounted to 775 as compared with 493 for May, 1947. While some of the increase can be attributed to a better supply of ranges, a good deal of the gain is felt to have resulted from their Range of the Month program.

In May, a Roper clock-controlled range was featured at $324. Although only sixty-nine of these were sold, the campaign served to draw attention to other modern ranges and to upgrade the type of ranges purchased. Of the 543 ranges sold at retail, forty-eight per cent were CP ranges, with just about half of these clock-controlled models.

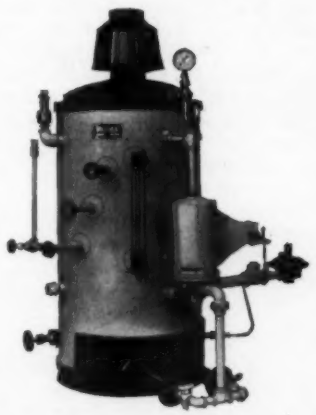
Dollar sales for the first five months of 1948 showed a gain of about nineteen per cent over the same period in 1947.

Robertshaw-Fulton Features Need of Temperature Controls

To maintain and broaden customer acceptance of temperature controls bearing their trademarks, Robertshaw-Fulton Controls Co., Youngwood, Pa., has launched a series of advertisements in a number of popular magazines. These impress upon readers the convenience and dependability of temperature controls for water heaters, ranges and other household appliances.

Notable among these advertisements is one appearing in "Time" in two colors entitled "From Roost to Roast." This envisions with illustrations how Robertshaw-Fulton controls are used in the incubator, for transportation and poultry processing and finally in the automatically controlled domestic gas oven.

LATTNER GAS BOILERS
1 H.P. to 45 H.P.



2 H.P. Gas Fired Pressing machine boiler. 100 lbs. ASME Code.

P. M. LATTNER MFG. CO.
CEDAR RAPIDS, IOWA

IRON OXIDE

For purifying Manufactured Gas. 1000 tons ready for Summer delivery.

Write at once

William Vennes, Grand'Mere, P.Q., Canada

The Reliable Shut-Off for Street Mains

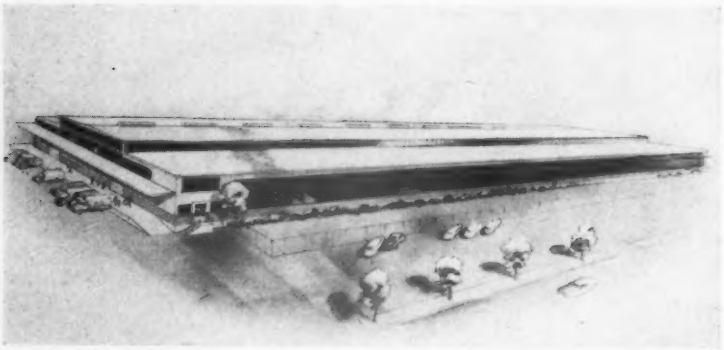
THE GOODMAN STOPPER

Now has the "Z" handle for easy manipulation. When locked in place it holds. Stopper cannot slip. Gas cannot pass. Adjusted in 30 seconds.

Ask for circulars on this and other distribution equipment.

Nearly a half century of service to the Gas Industry.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, New York



New Modern Factory of Mission Appliance Corp.

Pictured here is the ultra-modern new factory of the Mission Appliance Corp., Los Angeles, which was opened for operations in May.

The building is planned in the most modern functional design. Its most noticeable feature is the "planned flow" of materials, coming in as raw materials and leaving the assembly lines as Mission gas water heaters.

The building has dimensions of 165 feet in width by 800 feet in length and is situated on an 11 acre site, served by private railroad spur lines. The overall investment in the plant and equipment is reported to be in excess of $1,000,000.

A modern galvanizing department covering more than 6,000 square feet of floor space, is entirely enclosed and served by a system of air intake and exhaust facilities that keep the air fresh and free of impurities.

Special facilities for quality-controlled laboratories as well as new research and development facilities are included.

Bert Sutton, president of the company, points to the fact that production will be speeded with half a million dollars worth of new machinery especially designed for high-speed straight-line production.

New York P.S.C. Approves Consolidation of 3 Utilities

The Public Service Commission of New York approved June 18th consolidation of Long Island Lighting Co., Queens Borough Gas & Electric Co. and Nassau & Suffolk Lighting Co. into a single operating utility to be known as Long Island Lighting Co., with assets of about $140,000,000.

The unanimous decision of the P. S. C. was based upon an opinion by Milo R. Maltbie, chairman of the commission. The three companies provide gas and electric service in part of Queens and in most of Nassau and Suffolk Counties, on Long Island.

The commission approval holds "that the unification of the three companies is generally in the public interest, except a part of the plan under which it is proposed to pay to owners of the outstanding 3,000,000 Long Island common shares an unnamed sum in liquidation of their interest."

However, the question of cash payment to common shareholders was not part of the application to the P. S. C., but was submitted by Long Island Lighting in a similar petition to the Securities and Exchange Commission with a view of paying common holders about 35 cents a share.

Suburban Propane Gas Corp. Appoints S. J. McLagan

S. J. McLagan has been promoted to retail sales manager of Suburban Propane Gas Corporation, Whippany, N. J. This was announced recently by Mark Anton, president, as a step in the corporation's expansion program throughout its nine-state marketing area.

Mr. McLagan, a veteran of the liquefied petroleum gas industry, has been serving as the company's wholesale and industrial manager since 1945. He was wartime operations manager of a predecessor unit of Suburban Propane and was former sales manager of the New Jersey Power and Light Company.

DETROIT'S "FIRST"
IN CONVENIENCE · COMFORT · QUALITY
In the heart of the downtown, office, theater, and shopping area. Friendly, courteous service to make your stay in Detroit a pleasant memory. The Tuller Coffee Shop or Cafeteria for excellent Food modestly priced. The Hotel Tuller, Detroit's largest, is the place to stay.
VISIT OUR Cocktail Lounge
ONE OF DETROIT'S FINEST
800 ROOMS WITH BATH FROM $2.75
Hotel Tuller
FACING GRAND CIRCUS PARK
RICHARD C. HODGES, Manager

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Gas Distribution Engineer

for employment with large company in southwest. Must be a college graduate with at least five years experience in the gas distribution field. Experience in load analysis, pressure analysis and distribution design and construction is preferred. Reply to Box 185, American Gas Journal, setting forth in detail—experience, education and expected salary.

Gas Engineer Wanted

Experienced in water gas and coal gas operations. Distribution experience helpful but not necessary. Southern New England location. Graduate engineer preferred. Write Box 184, c/o American Gas Journal Inc., 53 Park Place, New York 7.

Position Wanted
Water Gas Maker

Position wanted by experienced water gas maker who can take full charge of plant. Reliable man with preference for small plant. Can produce satisfactory results. Address Box 183, c/o American Gas Journal, 53 Park Place, New York 7, N. Y.

FOR SALE

Minneapolis - Honeywell Motorized and Solenoid ¾" gas valves, pilotstats, transformers and thermostats. Schoenberger ¾" and 1" shut-off cocks. Gas regulators. All new, perfect condition. Write "Advertiser," 687 S. Post, Detroit 17, Mich.

Backrun Valve for Sale

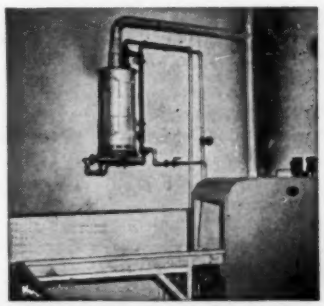
1-30" Semet Solvay hydraulically operated three way valve with spray manifold for gas oil operation, 24" backrun connection, 30" washbox and superheater connections. Valve spray manifold can easily be modified for heavy oil operation. Valve was purchased new in 1945 and has been used 7000 hours. Valve was removed when set was converted to oil gas generator and is in excellent condition. Write:

Binghamton Gas Works, 289 Court St., Binghamton, N. Y.

Attention George Dorner

Space Heaters. Bulletins issued by Inland Steel Container Company, 325 No. Cortez, New Orleans, La., describe two of their space heaters—the "Comforteer," a circulator gas heater, and a similar model which includes a radiant feature as well. Both can be used with all types of gas. Colorful bulletins with descriptive detail available on request.

AN ACTUAL INSTALLATION OF THE ONLY THERMOSTATIC INSTANTANEOUS GAS WATER HEATER



This installation has been operating for the past several years in the large cafeteria of the High School at Orange, Texas. This No. 3 HOTOMATIC is boosting 140° temperature water from a storage tank up to 180 degrees at a rate of about 4 gallons per minute for a large Hobart Dishwater. Many State Health Departments are requiring 180° sanitary water for Cafes and Cafeterias. Any number of HOTOMATICS can be hooked together to supply large quantities of hot water.

Four models available. All 60° rise,—40, 60, 90 and 120 G.P.H.

AGA approved controls.

Approved by I.G.A. Gas Combustion Engineers

Write For Folders

Little Giant Water Heater Co.
907 7th Street, P. O. Box 29
ORANGE, TEXAS

Water Heating

(Continued from page 30)

tank during the entire recovery cycle of operation and *reduce* the differential between the temperature of the water at the top and that at the bottom of the storage tank to as little as 5 or 6°, F.

Attention is invited to the fact that the successful operation of the patented, Booster-Recovery, Two Temperature Water Heating System, as described in Part 2 of Chapter IV * and shown in Figures 4 and 5, depends entirely upon *reversing* the conventional direction of recovery circulation flow between the heater, or heaters, and hot water storage tank. The heater — during booster cycles of operation when supplying high temperature water for the rinse in a spray type dishwasher—would be incapable of maintaining the required discharge temperature and rate of flow if the recovery circulation flowed in the conventional direction and a demand for the high temperature boosted water occurred at the time cold water had accumulated in the bottom of the storage tank in not quite sufficient volume to shock the tank aquastat and start a recovery operating cycle.

The heater in a Booster-Recovery Water Heating System which can supply hot water at *two* temperatures is able to supply high temperature water at the required rate of flow and at the required temperature during the booster cycle of operation *only* because of the fact that the water supplied *to* the heater is drawn from the *top or upper zone* of the hot water storage tank where the temperature of the water never drops below the required minimum established by the setting of the tank aquastat, unless the over-all capacity of the system is totally inadequate.

* *American Gas Journal, May, 1946.*

(Continued in August)

Robertshaw-Fulton Completes Second Gas Well on Property

Robertshaw-Fulton Controls Company has announced completion of drilling of a second gas well on the property of the company's Robertshaw Division at Youngwood, Pa. The two wells now flowing will have an annual capacity of over 36 million cubic feet.

By drilling these gas wells, Robertshaw-Fulton Controls Company has insured for its Robertshaw Division an adequate supply of vital fuel for next winter, thus being able to operate unhampered by any possible restrictions that might be placed on commercial gas facilities in the community.

Catalytic Cracking

(Continued from page 14)

pletely take over the supply of gas to the remote area and relieve the transmission system of that supply.

3. Being a continuous process with great flexibility in production rate, it requires no storage holder and can feed directly into the distribution system to satisfy the load requirements.

4. Automatic control makes possible operation with a minimum of labor.

5. Purification of the gas is not necessary.

6. Operation of the plant produces no smoke or dust.

7. Capital investment is comparatively low.

8. At the time of writing, feed-stocks of natural gas, propane, butane, refinery gas and natural gasoline may be used. Research now under way will undoubtedly result in other feed-stocks being added to this list. If a low cost feed-stock can be found this type of plant may well be the base load plant of tomorrow.

Presented at the 1948 A.G.A. Joint Production and Chemical Committee Conference, Asbury Park, N. J., May 24-25-26, 1948.

Valuation and Depreciation of Public Utility Property

In the June Proceedings of American Society of Civil Engineers, Maurice R. Scharff, Consulting Engineer of New York, contributes a paper of considerable interest to gas company executives. He uses as an illustrative example, a hypothetical manufactured gas plant based on selected data and aimed at a practical solution rather than theory.

The paper reviews the status of the "fair value" and depreciation problems as they have been left by decisions of the United States Supreme Court in cases arising under the Natural Gas Act and concludes that the confusion in which they are enmeshed is deeper than ever. It is suggested that because of this confusion, and because of the inadequacy of currently accepted theories for the adjustments that will be required if the prospects of revolutionary developments in the field of power generation are realized, a general reconsideration of these problems by the engineering profession is appropriate.

A solution is suggested based on the conceptions that "fair value" and "service value" are identical and that reasonable rates are no more than those required to cover the cost of rendering the existing service if provided by facilities of the most modern and efficient kind available as a result of progress of the arts, and of capacity no greater than that required to meet the demand. It is proposed that the equal annual payment annuity, at a reasonable rate of return, on the cost of such facilities be included in such costs; and that the "fair value" or "service value" of the existing property is the present worth at a reasonable rate of return, for a reasonable future capitalization period, of the amount available from such reasonable rates after deducting the operating expenses, other than depreciation, of the existing facilities.

Fraser Appointed Vice-Chairman of A. G. A. Technical Section

William R. Fraser, experimental engineer in the Detroit District of Michigan Consolidated Gas Company, has been appointed vice-chairman of the Technical Section of the American Gas Association to fill the unexpired term of S. J. Modzikowski, chemical testing engineer of The Peoples Gas Light and Coke Company, Chicago, who resigned due to illness. The appointment was made May 25, by A. C. Cherry, Cincinnati, chairman of the A.G.A. Technical Section, following the recommendation of the Nominating Committee and unanimous approval of the Section's Managing and Executive Committees. Mr. Fraser's term of office expires in October, 1948.

Mr. Fraser's selection as vice-chairman follows a long period of active work in Association affairs. At present he is a member of the Technical Section Managing Committee and chairman of the Corrosion Committee. He is also active on the Gas Production Research and Domestic Gas Research Advisory Committees, Domestic Gas Appliance Installation and Improvement Committees and past chairman of the Mixed Gas Research Group. In addition, he is a member of the Liquefied Petroleum Code Committee and the Natural Gas Research Technical Advisory Committee.

Progress in Cities Service 26 inch Pipe Line

Cities Service Gas Company is making good progress on the Ottawa to Kansas City section of their new 26-inch pipe line which eventually will extend from the Hugoton field in Kansas to Kansas City. Fine weather has enabled the contractor to work ahead of schedule. Work on this section was started by the contracting firm shortly after the contract was obtained.

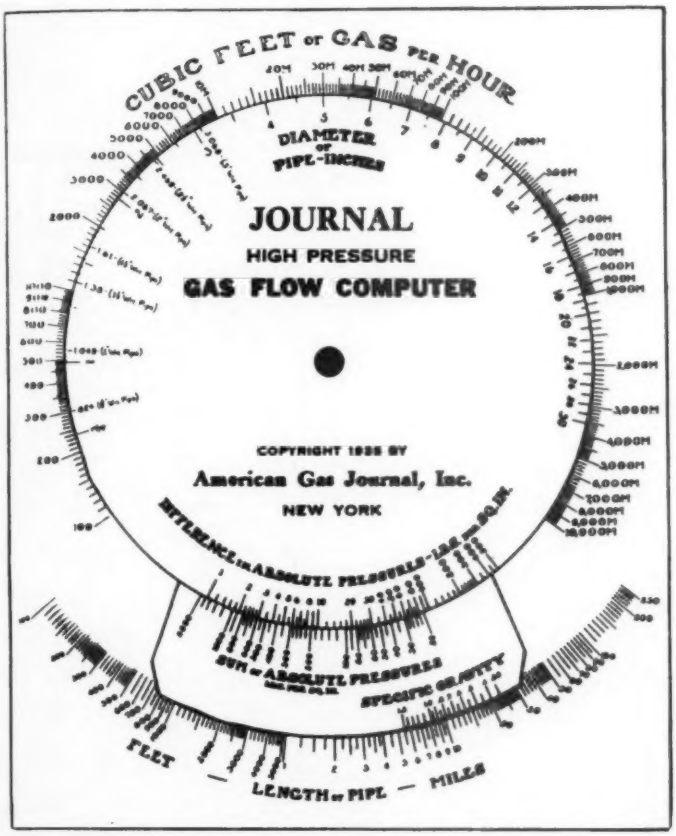
The two new 26-inch Arkansas river crossings on the Hugoton line south of Hutchinson have practically been completed.

JAMES K. CROWELL

James K. Crowell, 62, New York District Manager for the Dresser Manufacturing Division, Bradford, Pa., died May 25, 1948, at his home, 230 East 50th Street, New York City, following an extended illness.

Mr. Crowell, like his father before him, spent his lifetime in the gas industry. Born in Yonkers, N. Y., he was employed for 28 years by the Westchester Lighting Co., Mt. Vernon, N. Y., serving in different capacities. At the time he joined Dresser in the fall of 1929, he held the position of Engineer of Gas Distribution

"Journal" Gas Flow Computers



These Improved Gas Flow Computers are available in durable celluloid, encased in a convenient leatherette cover with complete instructions.

Actual Size 6¼ x 7½

☆

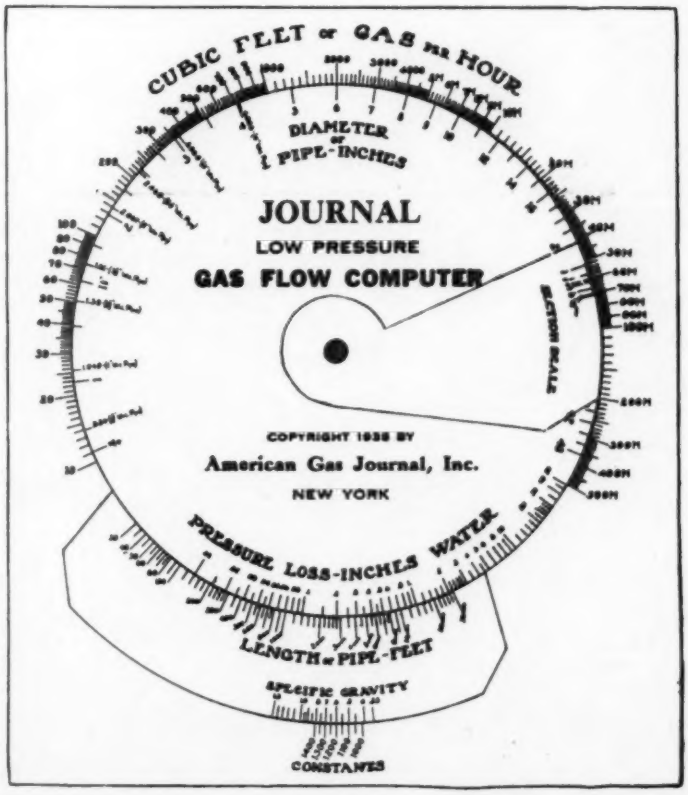
High Pressure Computer Range:

Cu. Ft. of Gas Per Hour—100-10,000 M
Diameter of Pipe Inches ¾-30
Difference in Absolute Pressure—Lbs. per sq. in. 1-500
Sum of Absolute Pressures—Lbs. per sq. in. 2000-20
Specific Gravity 1.5-.35
Length of Pipe—Feet 100-5000
Length of Pipe—Miles 1-250

Low Pressure Computer Range:

Cu. Ft. of Gas Per Hour—10 to 500 M
Pipe Diameter ¾" to 48" (including standard and actual weight up to 4")
Pressure Loss Inches .01-10.
Length of Pipe—Feet 30-30,000
Specific Gravity 1.5-.35
Constants 1400-1000

Price $4.00 Each, Postage Prepaid



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